

257-8.

# FERRO CONCRETE

**K. HOLST & Co.**  
Engineers & Contractors  
WESTMINSTER CHAMBERS,  
1, VICTORIA STREET, LONDON, S.W.1







# FERRO-CONCRETE



**K. HOLST & Co.**  
Engineers & Contractors

*(K. HOLST—Danish)*

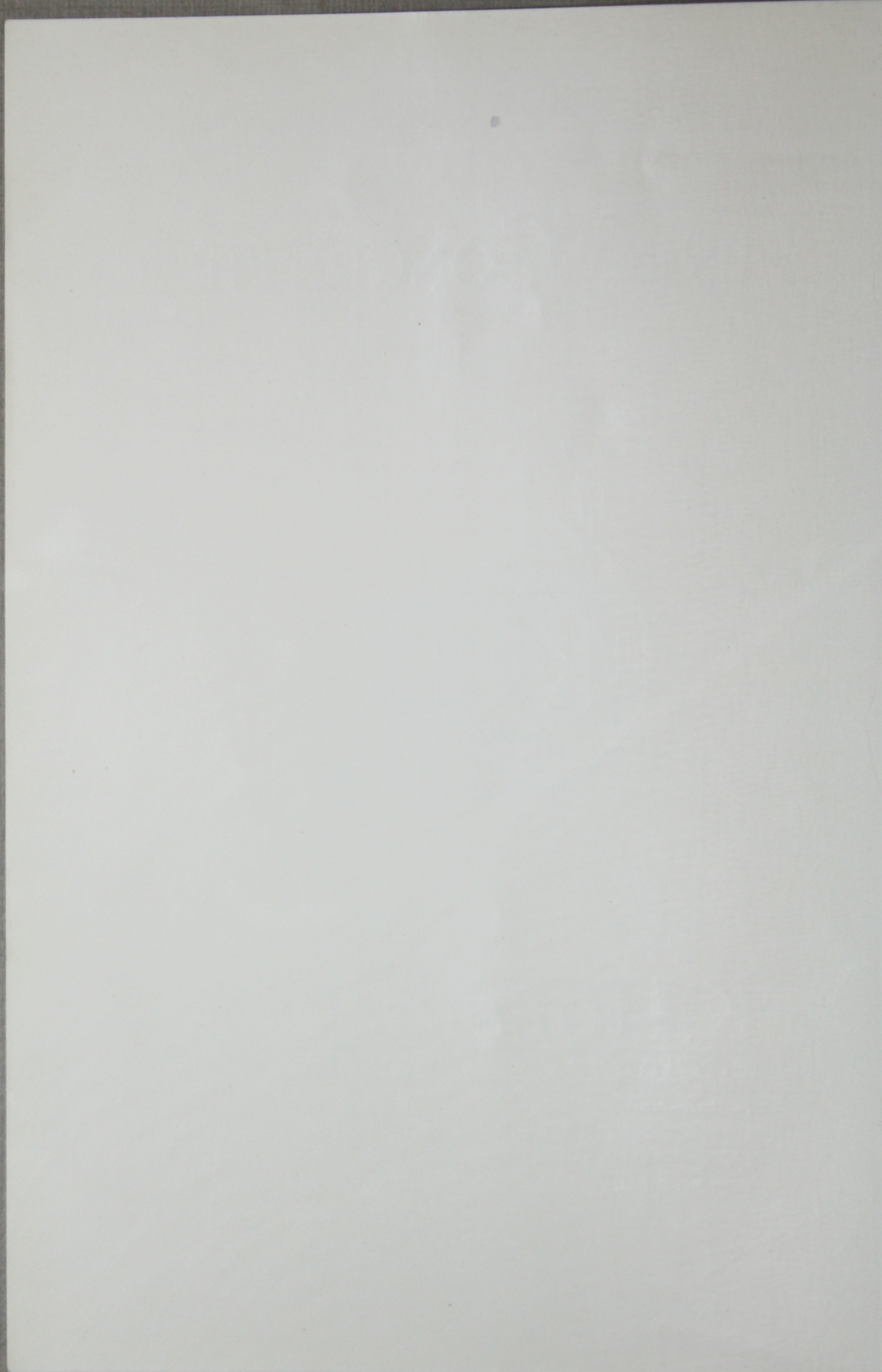
*C. F. LUNOE—Danish*

**WESTMINSTER CHAMBERS,  
1, VICTORIA STREET, LONDON, S.W.1**

Telegrams : Ferrolst, Vic., London.

Telephone : Victoria 4234.







## INTRODUCTION

OUR object in issuing this brochure is to indicate, by means of illustrations of some of the typical structures we have erected, the nature of the service we are able to offer in connection with Ferro-concrete work. It is not thought necessary to elaborate on the manifold advantages of Ferro-concrete as a structural material, nor is it proposed to enter into a lengthy dissertation on the principles of its design. The very rapid progress which it has made in recent years affords sufficient evidence that its qualities are now fully appreciated, whilst many excellent text-books deal adequately with all technical details.

The difficulty of ensuring that the work would be carried out strictly in accordance with the intentions of the Designer, has, however, prevented the adoption of Ferro-concrete in many cases where its use would otherwise have been economical and desirable. It is this difficulty that we have set ourselves out to remove, and in order to do so we have built up an organisation which, combining as it does the functions of the specialist Designer with those of the specialist Contractor, enables us to accept entire responsibility for the completed structure, both as regards design and construction. Designs for every type of Ferro-concrete structure are prepared in our own offices, they are carried out expeditiously and economically in any part of the country, under the expert supervision of our own Foremen, and in every case the stability of the structure is guaranteed; this we believe to be

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the only true economical method of absolutely ensuring that every detail of the construction will be properly and efficiently carried out, and some evidence of our capability and the success of our methods is afforded by the illustrations which follow.

Our designs are usually based on the use of plain round mild steel rods. The use of fabricated bars and similar devices offer advantages in no way commensurate with the additional cost involved and are frequently a hindrance rather than otherwise to the designer in his attempt to find the most economical solution to his problem. We have, therefore, especially refrained from adopting any so-called patent "System" of construction, but have left ourselves free to base each proposal on that design which our experience shows to be best suited to the purpose in view, and to embody in it the most up-to-date and approved engineering practice.

In offering our services to Engineers, Architects, and others having structural work in contemplation, we have every confidence that we are able to provide a thoroughly sound structure at the minimum cost consistent with efficiency in design and construction. We cordially invite enquiries, and will gladly submit a proposal, with an outline drawing, specification, and estimate of the cost for any prospective work. Should it be necessary to obtain the sanction of the Ministry of Health, the Ministry of Transport, or other Authority, we are always prepared, after the provisional acceptance of a tender, to furnish detailed drawings and such other information as may be required for that purpose.

K. HOLST & Co.

*A series of notes, covering the main points upon which information is desired in connection with various types of structures, are inserted in the following pages. It is hoped that they will be of assistance in the preparation of enquiries.*



EVERY Estimate is put forward after careful consideration of the requirements, and—unless an approximate quotation only is especially asked for—is a binding TENDER to carry out the whole of the specified work for the quoted sum. It carries with it our full GUARANTEE, the following clauses being inserted in every Specification :—

Responsibility for Design and Construction.

“ The Reinforced Concrete structure will be designed  
 “ by our own staff and erected by our own workmen, close  
 “ supervision being given during the execution of the  
 “ work and a fully skilled and competent Foreman being  
 “ constantly employed. FULL RESPONSIBILITY  
 “ for both DESIGN and CONSTRUCTION will  
 “ thus be borne by us.”

Maintenance and Guarantee.

“ We will maintain the structure in a sound and  
 “ perfect condition, subject to normal and proper use,  
 “ for a period of three months after its completion  
 “ (unless otherwise arranged), and we will make good  
 “ any defects which may arise within that period,  
 “ provided that such defects are promptly notified to us.”



Information desired for the purpose of preparing Estimates

GENERAL

Every Estimate is put forward after a careful inspection of the site and investigation of the local conditions by one of our Engineers, but if only an approximate price is desired, information on the following points will enable us to quote :—

- (1) Indicate, by reference to an Ordnance Sheet or otherwise, the exact location of the proposed structure, and, by means of a Site Plan, show its position relative to adjacent buildings (if any).
- (2) State the nature of the ground upon which the structure is to be founded (see special note regarding Foundations on page A2).
- (3) Is there a railway siding on to the site of the proposed work? If not, state distance from nearest Railway Goods Yard or Wharf and the nature of the road (surface and slope) to the site.
- (4) Is clean water available on the site? If not, state distance from nearest point of supply.
- (5) Is electric or other power available for driving concrete mixers, hoists, etc.?
- (6) May we have free use of above facilities?
- (7) Is working space available immediately adjacent to the proposed work? If not, state distance from nearest suitable plot.
- (8) How may surplus excavation (if any) be disposed of?
- (9) Is the Purchaser able to arrange for the haulage of plant and materials to site?
- (10) Information as to the nearest source of supply of a clean river or pit ballast or hard stone and clean sand may be of assistance.



## SECTION A

### BUILDINGS

The fire-resisting properties of concrete render it especially desirable as a material for Buildings of the Factory and Warehouse class. It is used throughout the whole building, being equally suitable in foundations, walls, columns, floors and roof, and every part is rendered equally fireproof.

The first cost of a building depends on many factors and a ferro-concrete one may in certain cases be more expensive than a steel or brick building. The lowest first cost, however, is not necessarily the cheapest construction, and when the factors of floor space, maintenance and fire risk are considered, it will generally be found that the balance is in favour of ferro-concrete. In considering this it should be borne in mind that insurance rates for a building of this type are very much less than for a steel one, and further that the contents of each floor are insurable separately, whereas in non-fireproof buildings the highest rate governs the whole structure. Another point of importance is that the vibration due to running machinery is very much less in a monolithic ferro-concrete structure than in a brick or steel frames building, and the maintenance charges under this head consequently reduced.

### FOUNDATIONS

Ferro-concrete may be employed with special advantage in the construction of both Raft and Piled Foundations.

In the former, the quantity of concrete required is reduced to a minimum, the weight of the foundation itself thus being correspondingly reduced, whilst at the same time there is a great saving in the amount of excavation.

A ferro-concrete pile can be used in every case where a timber one might be employed, and in very many cases where the latter would be impracticable. For example, in a soil which is alternately wet and dry, a timber pile is subject to rapid decay, whereas a ferro-concrete pile suffers no such deterioration and may be relied upon to give a permanent safe foundation. A further advantage of the ferro-concrete pile is that it may be cast to any desired dimensions and is not limited to the commercial lengths and sizes of timber.



Information desired for the purpose of preparing Estimates

FOR BUILDINGS

(See also Page 6 and "Foundations" below)

- (1) A sketch plan, sections and elevation, showing the floor area, with openings, etc., the number of storeys and the minimum height from floor to ceiling in each storey.
- (2) If circumstances necessitate the placing of stanchions in fixed positions, indicate such positions on plan.
- (3) Is shafting or other eccentric loading to be carried by stanchions? If so, state loads.
- (4) Give weights and positions of machinery, or any other concentrated loads to be supported, or alternatively specify an equivalent uniformly distributed load.
- (5) Is any special finish to floors required?
- (6) Type of roof preferred (flat, curved or ridged).

*If it is desired that we should quote for more than the skeleton ferro-concrete framework with floors and roof, please specify requirements fully.*

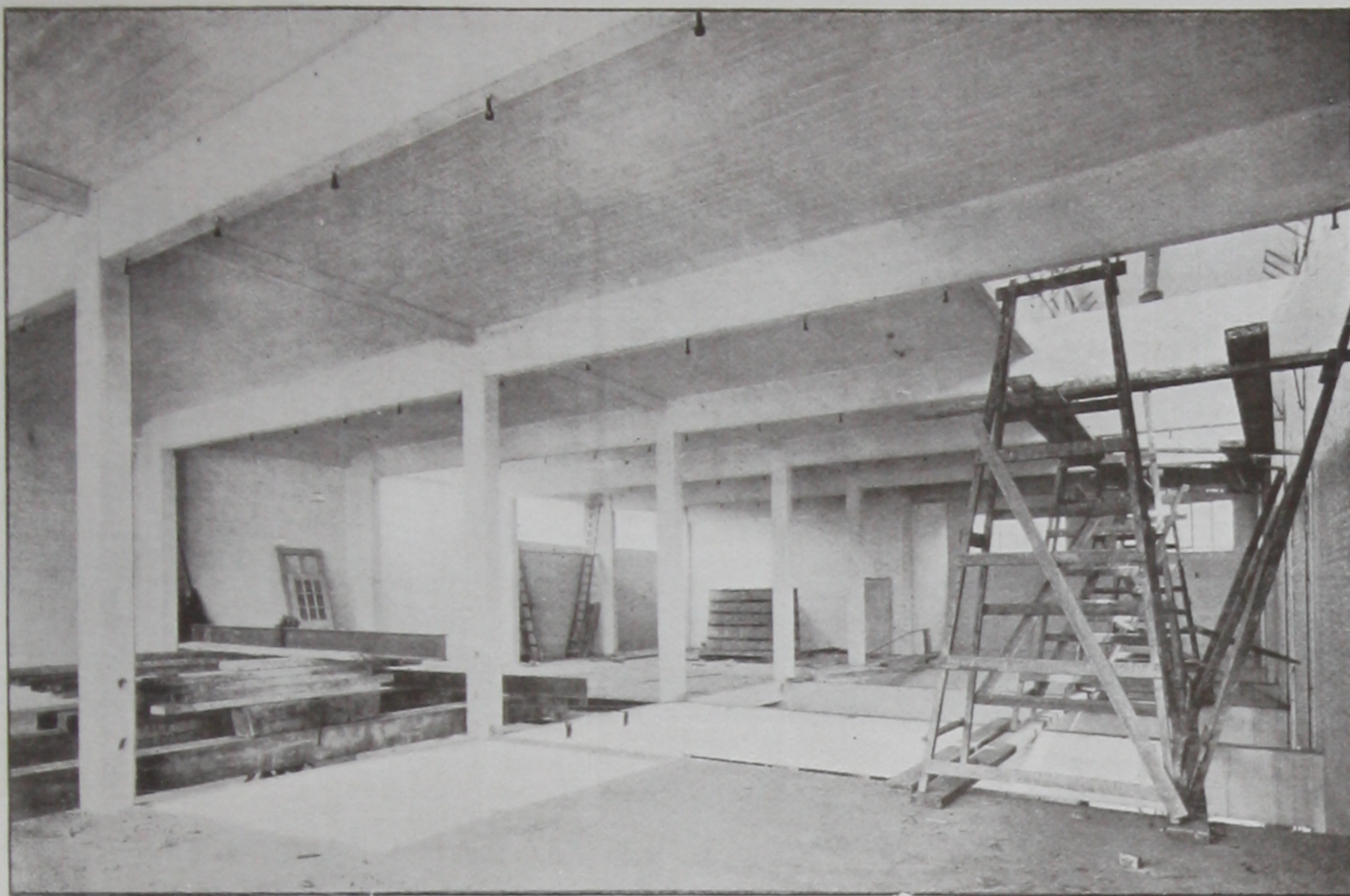
FOR FOUNDATIONS

(This information is required in connection with all types of structures. See also Page 6).

- (1) Give an outline sketch of the structure to be erected on the foundation, showing distribution of loads to be carried.
- (2) Specify the nature of the ground and the bearing power of the soil, and give results of any boring or trial holes which may have been taken on the site.

*Note.*—In the absence of definite data, it is our practice to base estimates upon an assumed bearing power of the soil, arrived at after a careful visual inspection of the site, the price being subject to confirmation or adjustment on opening up the ground. We strongly advise, however, the sinking of trial holes or the driving of test piles before tenders are invited, and we are prepared to undertake this work, charging only the actual cost to ourselves.





FERRO-CONCRETE  
FACTORY BUILDING.

For Messrs. Gibbs  
Fertilisers, Ltd.

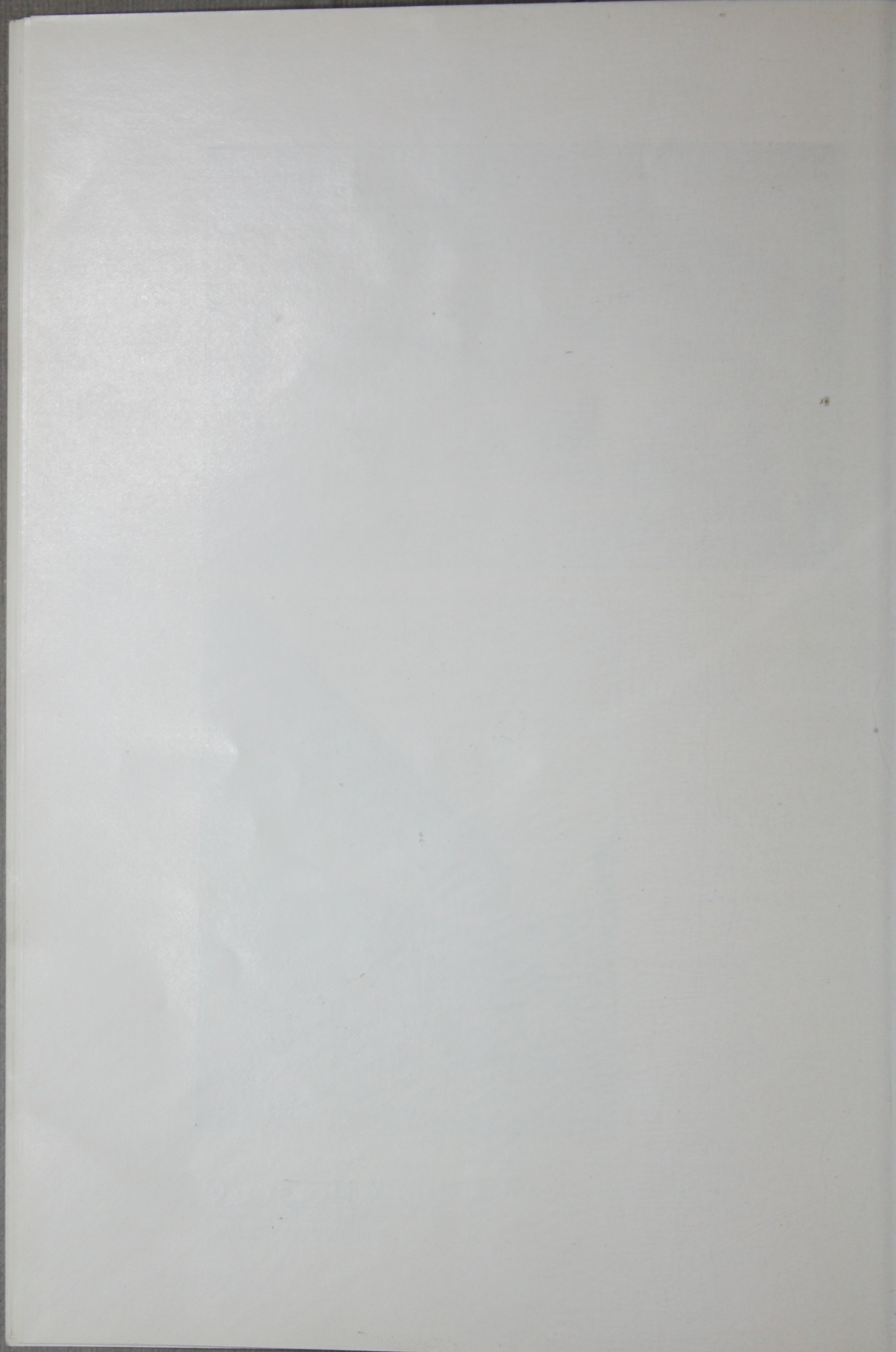
Victoria Dock, London, E.

(P. M. Fraser, Esq., F.R.I.B.A.  
Architect)

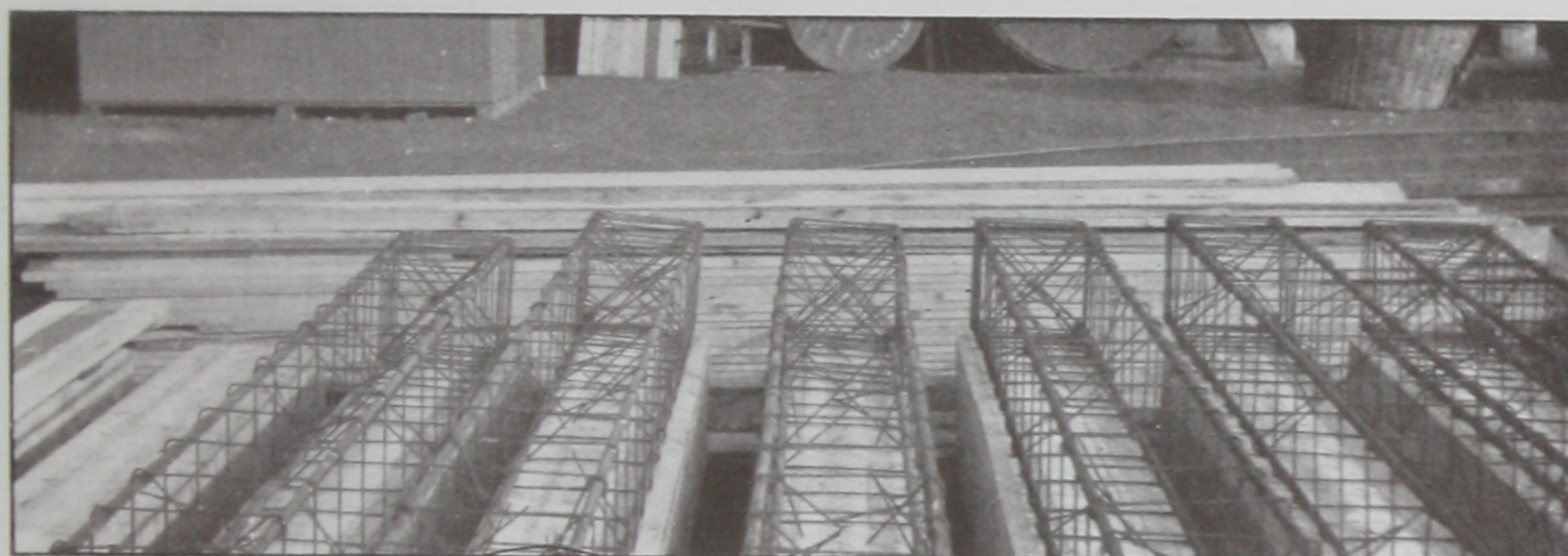
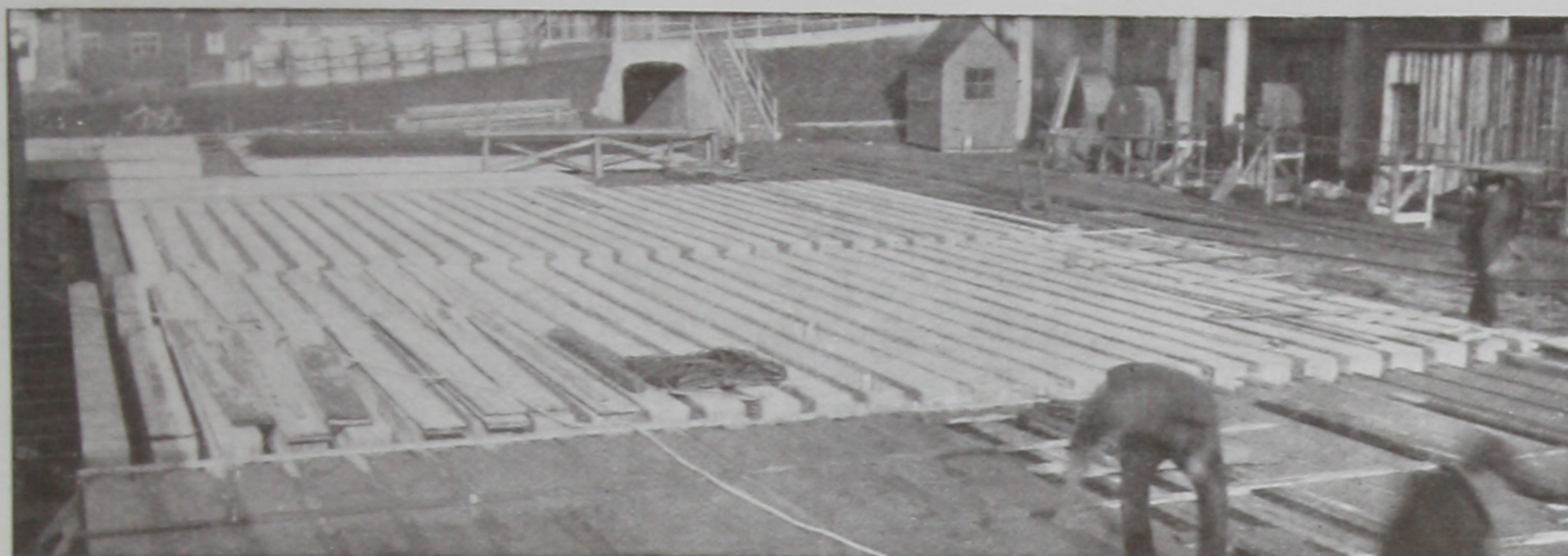


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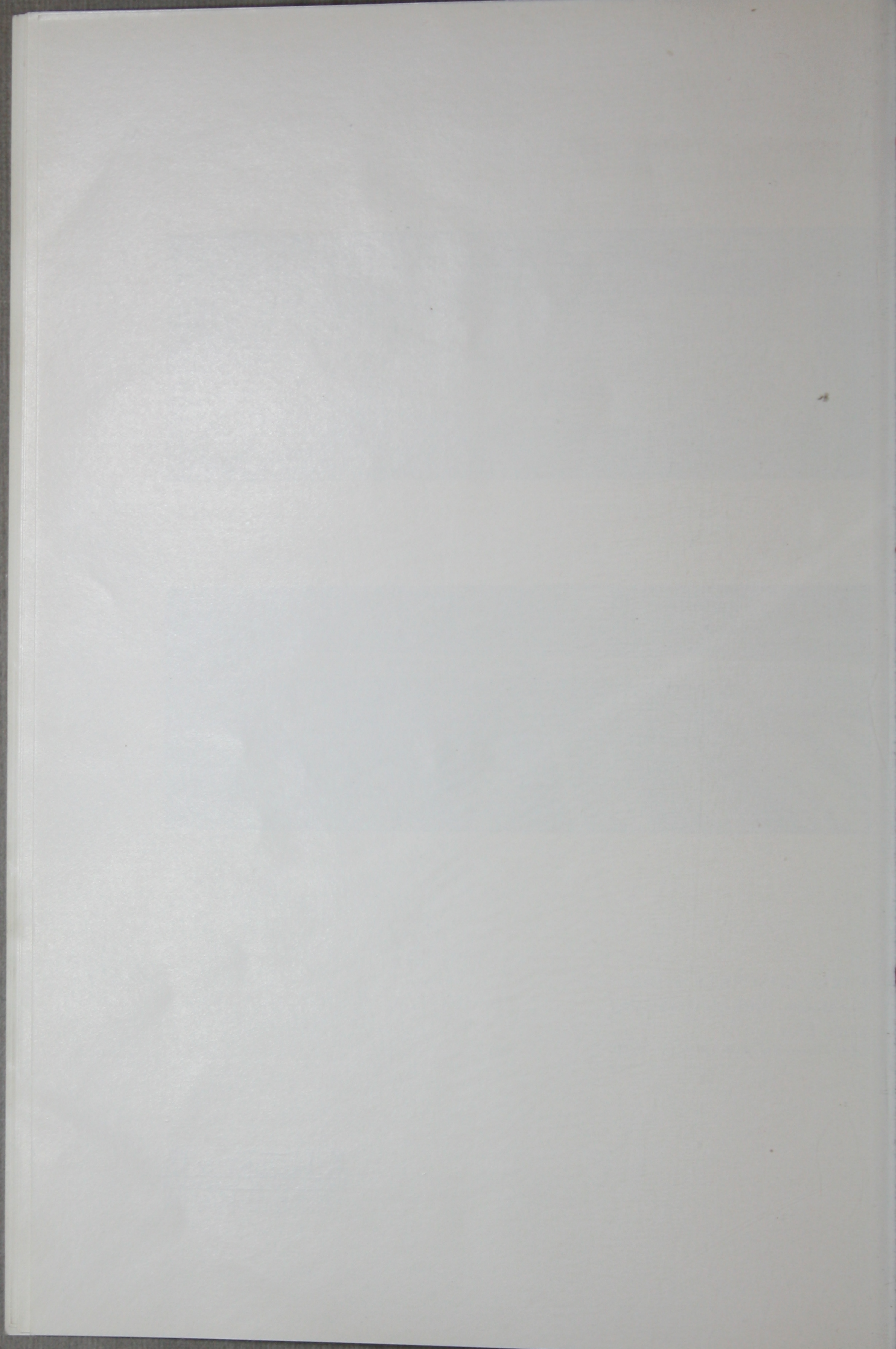


FERRO-CONCRETE PILING.  
For Messrs. Erith Oil Works, Ltd.  
Erith, Kent.

(P.M. Fraser, Esq., F.R.I.B.A., Architect).

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FERRO-CONCRETE PILING.

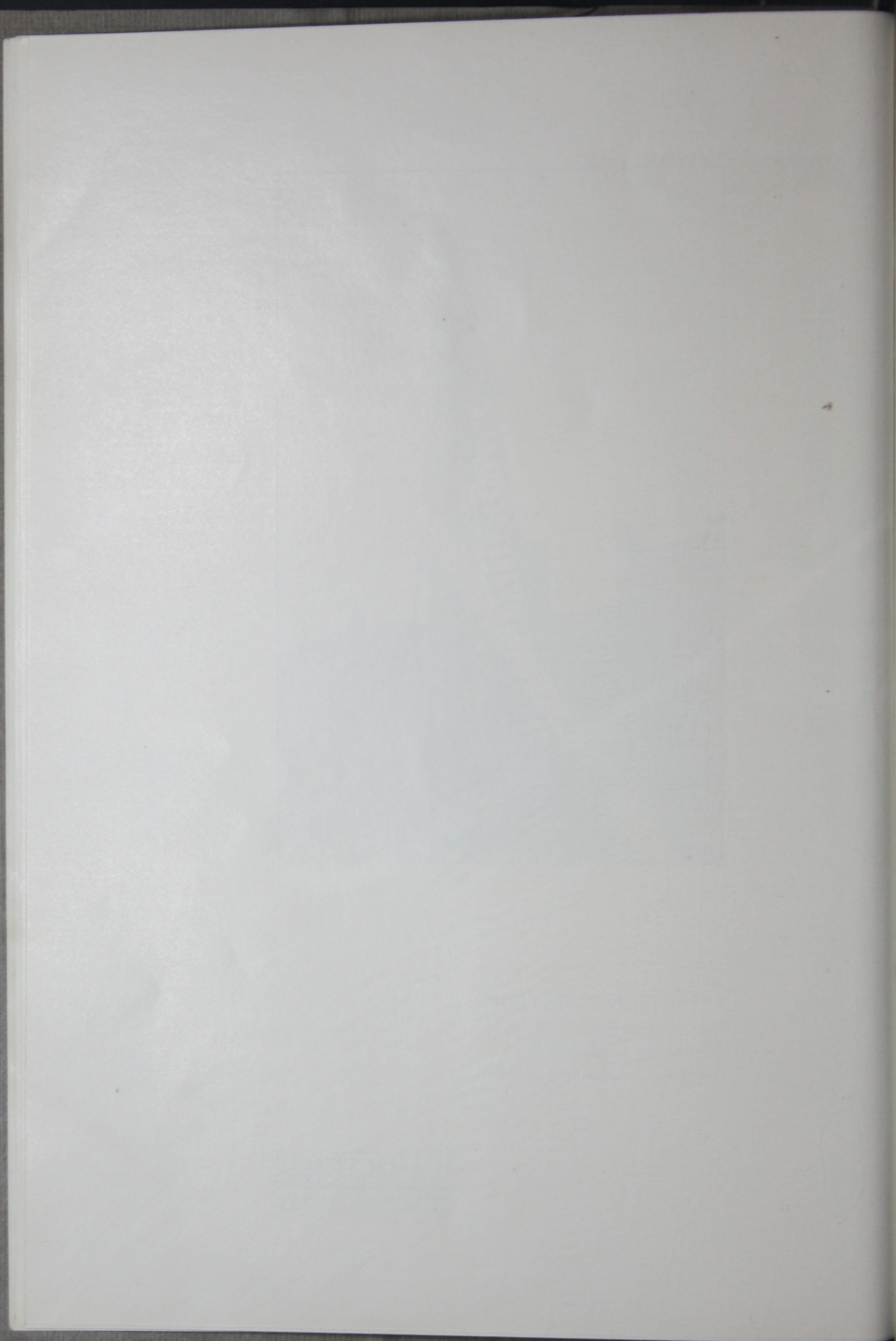
For Messrs. Gibbs Fertilisers, Ltd.

Victoria Dock, London, E.

(*P.M. Fraser, Esq., F.R.I.B.A., Architect.*)

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SECTION BBRIDGES AND CULVERTS

The ultimate economy of ferro-concrete bridges is very marked. The cost will invariably be found to be less than that of a mass-concrete or masonry structure, and will not exceed greatly, if at all, that of a steel one, while great economy is effected in the maintenance.

Ferro-concrete Bridges are free from the vibration often experienced in steel structures, whilst from the æsthetic point of view they have all the advantages of masonry, with the addition that the more slender construction enables more graceful lines to be given to the finished structure.

Another advantage of the use of ferro-concrete which will appeal especially to Local Authorities, is that the bulk of the materials can usually be obtained in the district and the wages of the labour employed in the construction are expended locally.

For Railway Bridges of moderate span, ferro-concrete is particularly suitable, its use practically eliminating from the fixed maintenance charges the expense of constant inspection and repair. A trough floor of ferro-concrete filled with ordinary ballast permits the use of ordinary sleepers on the bridges, and at the same time modifies to a great extent the shock of impact of trains entering and leaving the bridge.



Information desired for the purpose of preparing Estimates

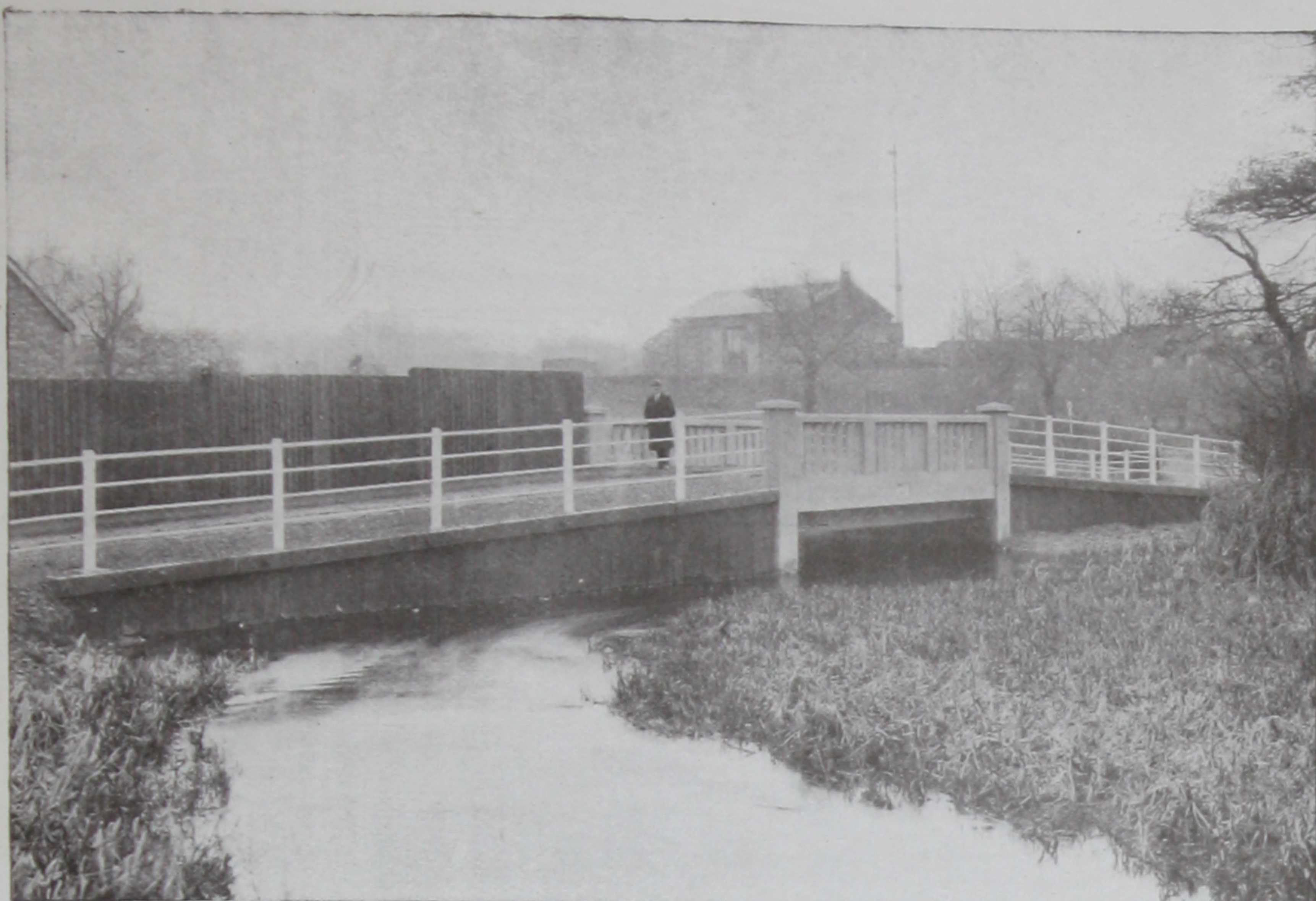
FOR BRIDGES

(See also page 6, and "Foundations," page A2)

Send a Cross Section of the River, Road or Railway to be spanned, and also state:—

- (1) Whether any particular type of structure is favoured, or whether it may be left to us to suggest the most suitable design.
  - (2) The number and length of spans (unless this also may be left to us).
  - (3) Minimum head room allowable underneath Bridge.
  - (4) Nature of traffic using Bridge, with description of heaviest vehicle, giving Weight, Width of Gauge and Length of Wheel-base.
- or (4a) Equivalent uniformly distributed load to cover loading required.
- (5) Clear width between parapets, and width of footpaths, if any.
  - (6) If Road Bridge, state type of Road (Macadam, Wood Blocks, etc.)
  - (7) If spanning a river, state height of high and low water, velocity of current, etc., with any information which may be available regarding floods, etc.
  - (8) Should provision be made for carrying traffic during construction? If so, state loading.

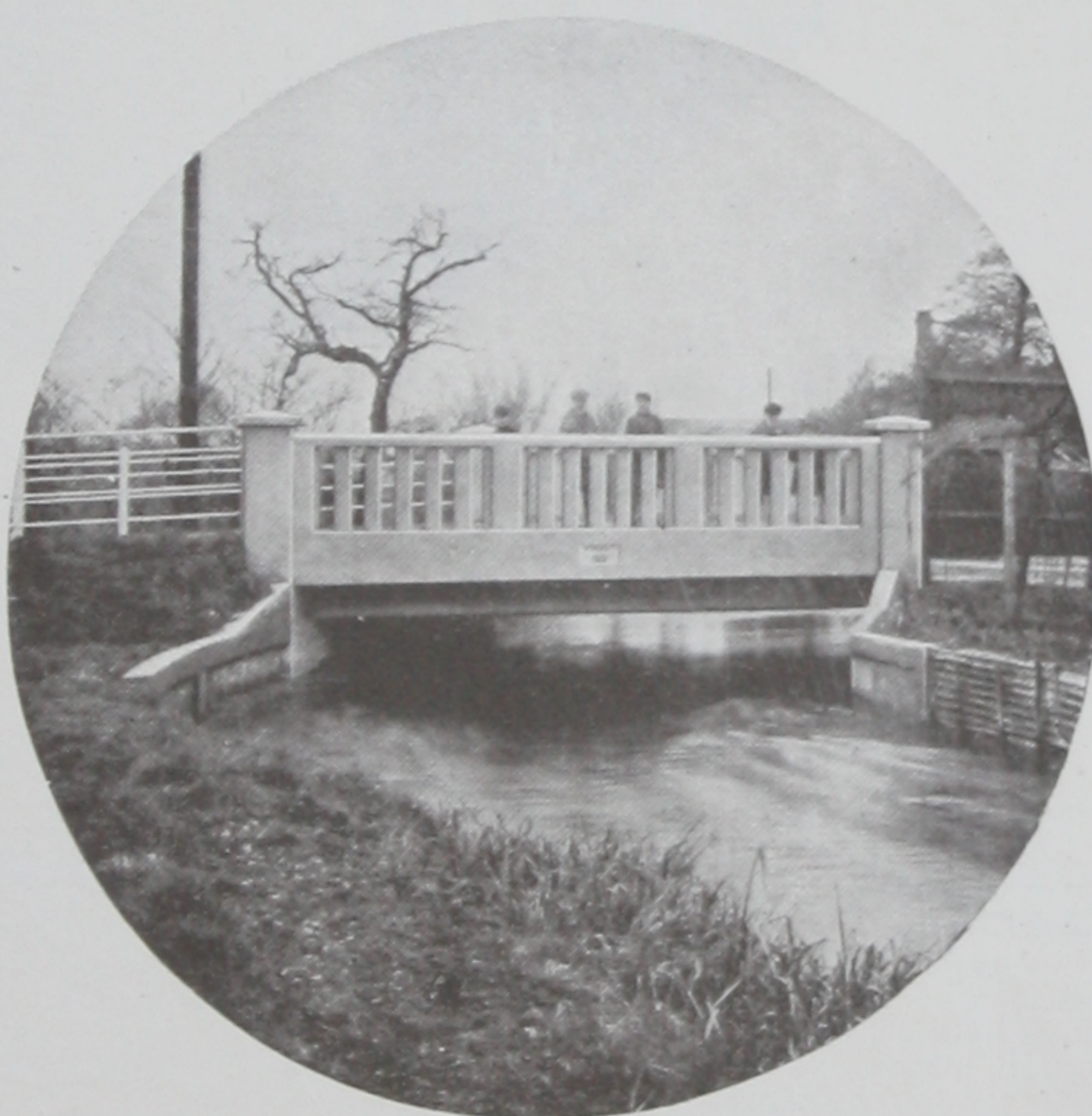




FERRO-CONCRETE  
ROAD BRIDGE.

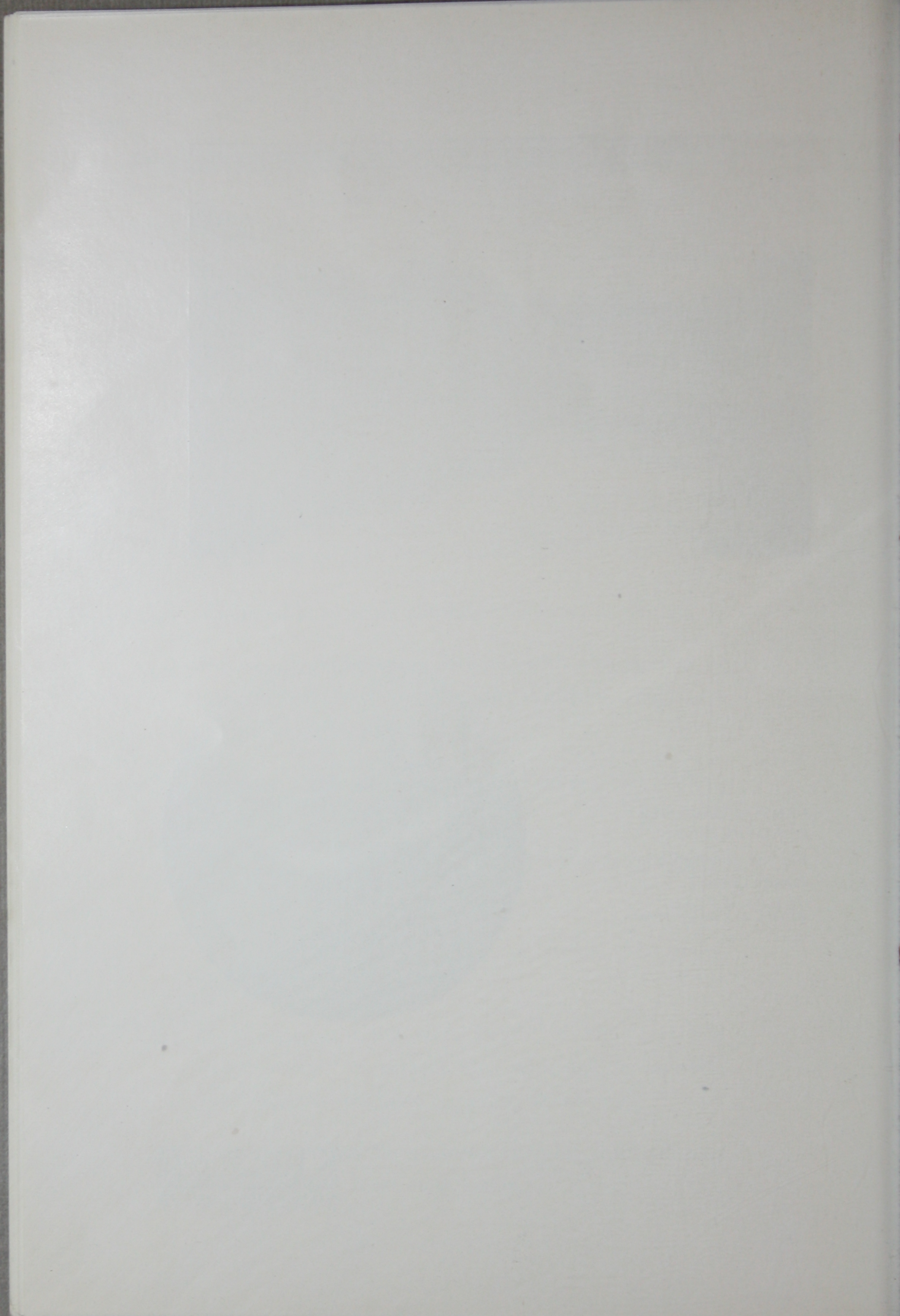
For the Hertfordshire  
County Council.

(*Lt.-Col. A. E. Prescott,  
M.Inst.C.E., County Surveyor.*)



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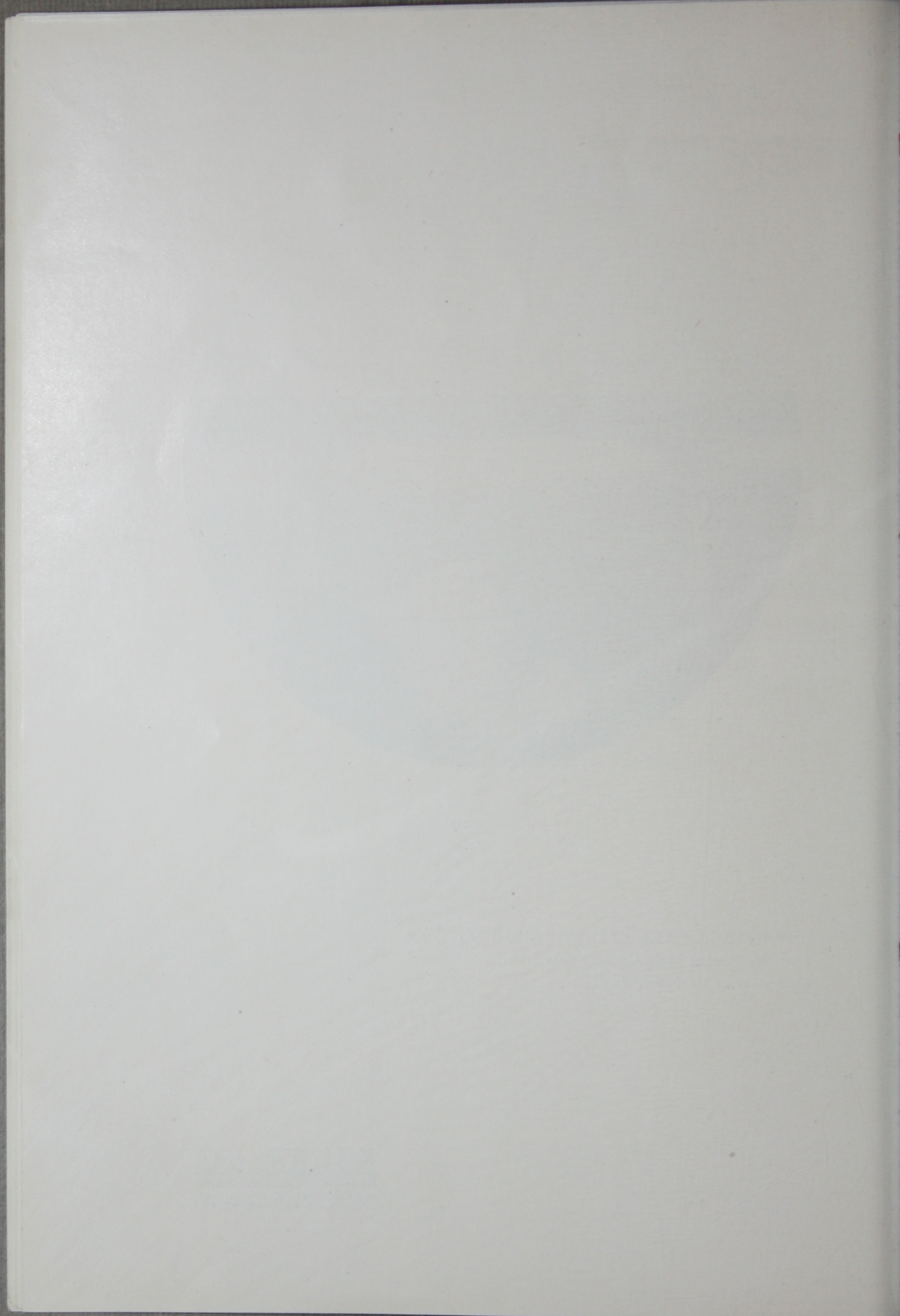




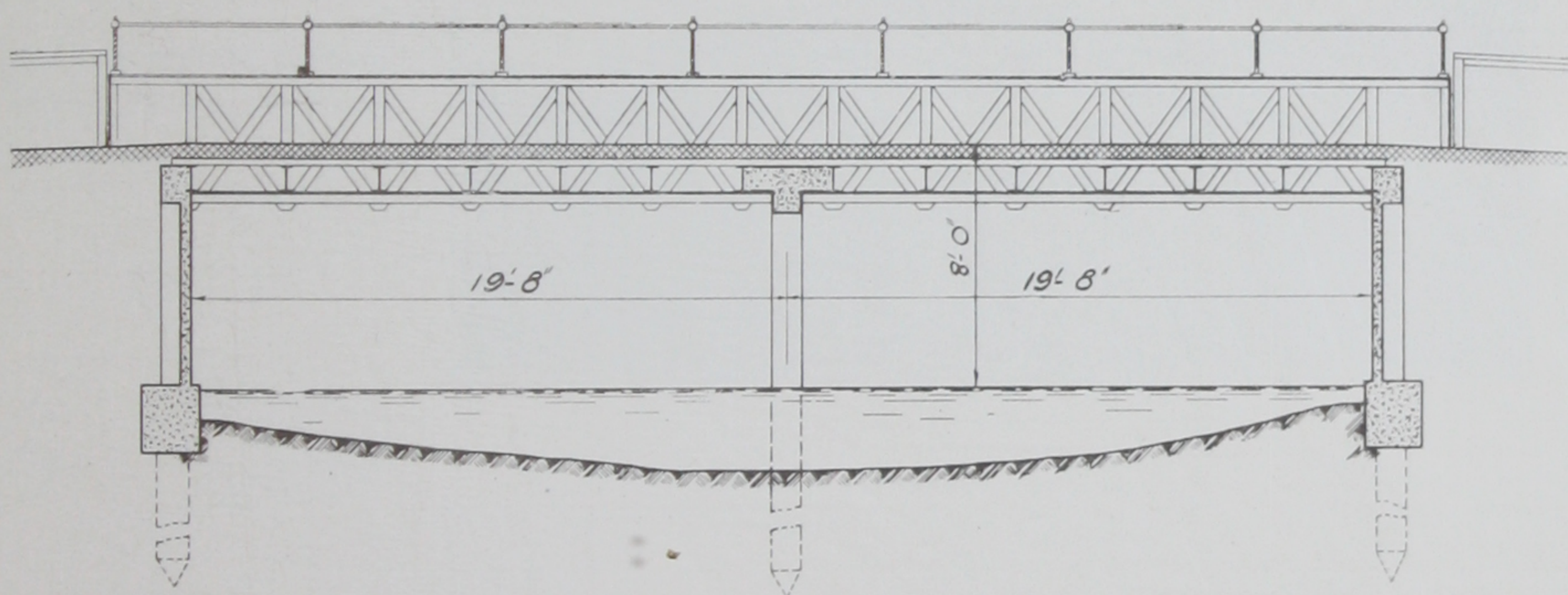
FERRO-CONCRETE RAILWAY BRIDGE.  
For The Darton Main Colliery Co., Ltd.,  
Darton, near Barnsley.

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FERRO-CONCRETE ABUTMENTS & PILE TRESTLE  
(TO STRENGTHEN EXISTING GIRDER BRIDGE).

For The Hertfordshire County Council.

(Lt.-Col. A. E. Prescott, M.Inst.C.E., County Surveyor).

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*Note the complete absence  
of obstruction to the Main  
Line during erection.*



FERRO-CONCRETE FOOT BRIDGE.  
(95 ft. span over G.C.R. Main Line & Sidings),  
For Sheffield Corporation Electricity Dept.  
(S. E. Fedden, Esq., M.Inst.C.E., Engineer).

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## RESERVOIRS & TANKS

The qualities of ferro-concrete render it especially suitable for the construction of water tanks and reservoirs. The tanks may be buried beneath the ground, built directly on the surface, or supported at any desired elevation upon a ferro-concrete tower and no difficulty is experienced in making them perfectly watertight. Here again the low cost of maintenance will always be found to compensate for any additional cost over that of a steel structure.

Ferro concrete tanks are also well adapted for the storage of chemicals. Resisting the action of acids of moderate strength better than most materials, it may be used for many chemicals without special treatment of any kind, and for nearly all kinds when adequately treated on exposed surfaces.

## BUNKERS & SILOS

Ferro-concrete has been used for Coal Bunkers, Silos, etc. for many years with entirely satisfactory results, and it has conclusively proved its serviceability for that purpose. It is cheap in first cost and the cost of maintenance is negligible, a point specially to be considered in works in vitiated atmospheres such as those of chemical factories, gas works, etc.

*Note.*—The slow speed of erection is sometimes given as an objection to the use of Ferro-concrete. This, however, is not strictly inherent in the material, as with proper organisation, work can be carried out equally expeditiously. The contractor is admittedly on the site longer than if steel construction is employed, since in the latter case, the greater part of the work is done in the contractor's yard, but the time between the placing of the order and handing over the finished structure need not be longer.



Information desired for the purpose of preparing Estimates

FOR RESERVOIRS & WATER TOWERS

(See also page 6 and note regarding "Foundations" on page A2)

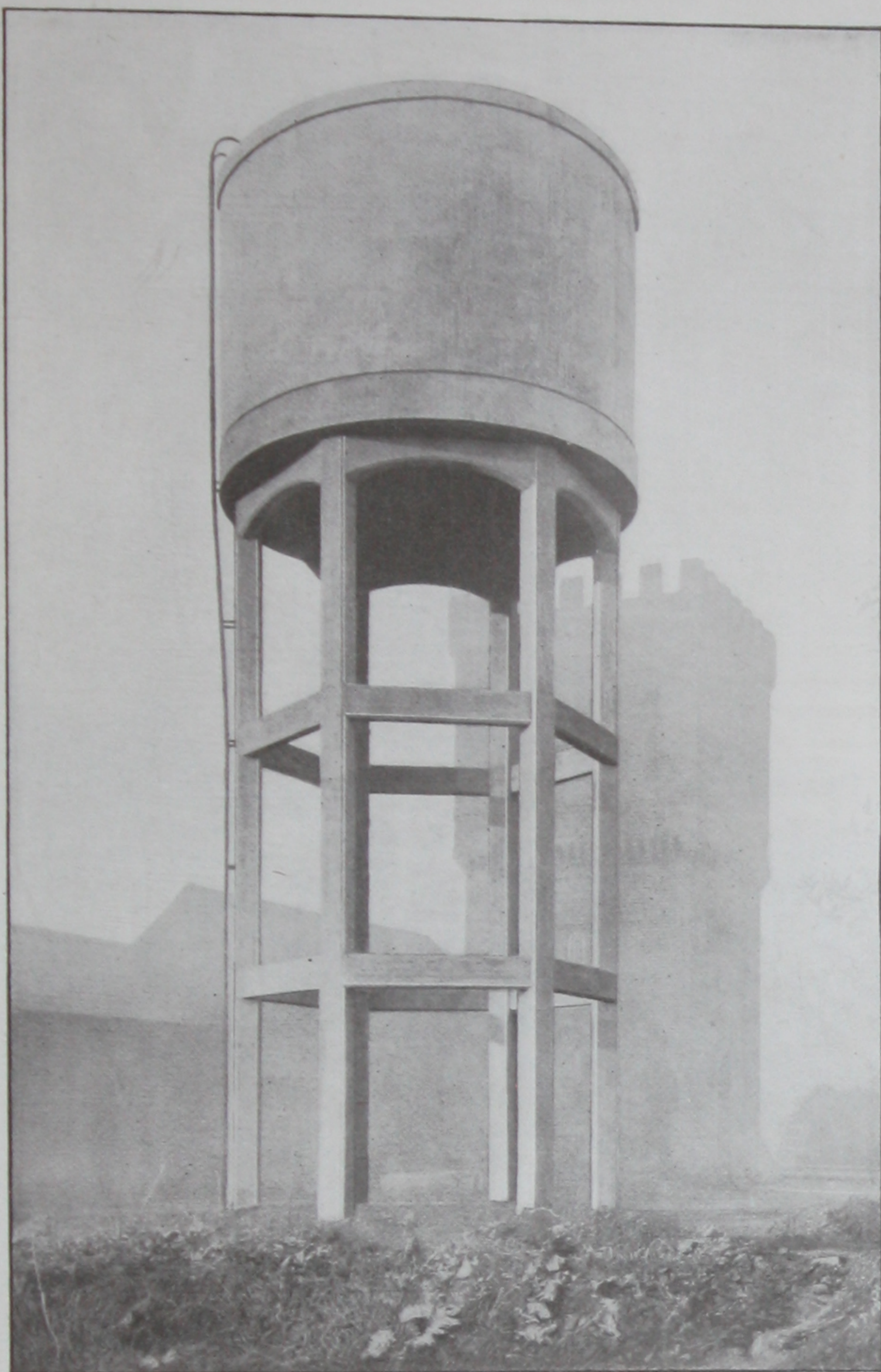
- (1) The capacity required and nature of liquid to be stored.
- (2) Are the dimensions limited in any way, or may it be left to us to suggest the most economical design? If they are already fixed, state :—
  - (a) Diameter, or
  - (b) Length and breadth.
  - (c) Depth.
- (3) Height from surface of ground to floor of Elevated Tank.
- or (3a) Depth from surface of ground to floor of Reservoir.
- (4) Is Reservoir to be roofed? If so, is it to be covered with soil and turfed?
- (5) Are pipes, fittings, etc., to be provided by us? If so, indicate position and size of existing mains on site plan and specify size of pipes and valves required.
- (6) Is special æsthetic treatment to be given, or will a plain structure suffice?

FOR BUNKERS & SILOS

(See also page 6 and note regarding "Foundations" on page A2)

- (1) The capacity required and the nature of the material to be stored.
- (2) Are the dimensions limited in any way, or may it be left to us to suggest the most economical design? If they are already fixed, state :—
  - (a) Diameter, or
  - (b) Length and breadth.
  - (c) Depth.
- (3) Height from surface of ground to outlet of silo.
- or (3a) Depth from surface of ground to floor of Bunker.
- (4) Is outlet gear to be provided? If so, specify type.





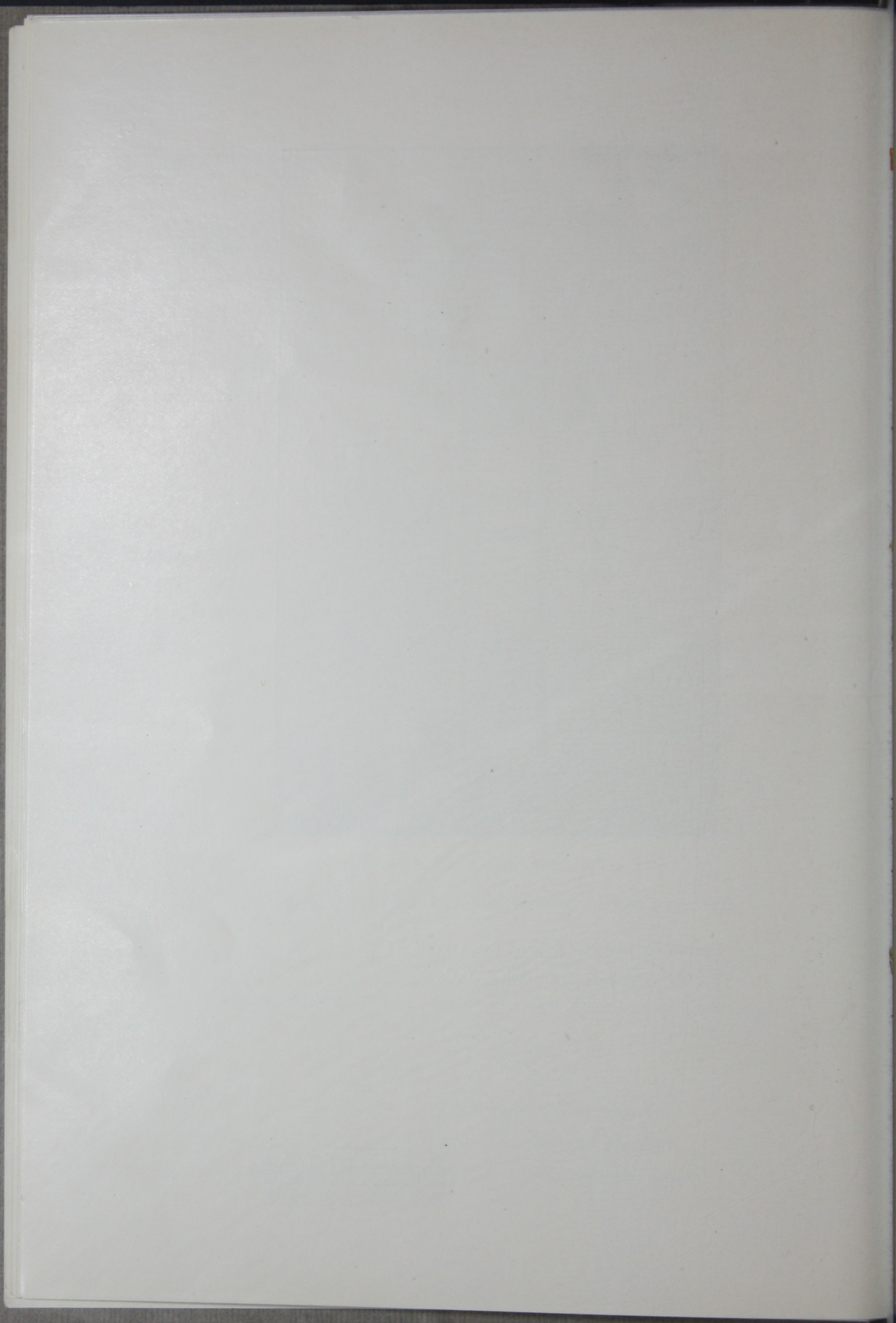
FERRO-CONCRETE WATER TOWER.

For the Burnham-on-Crouch U.D.C.,

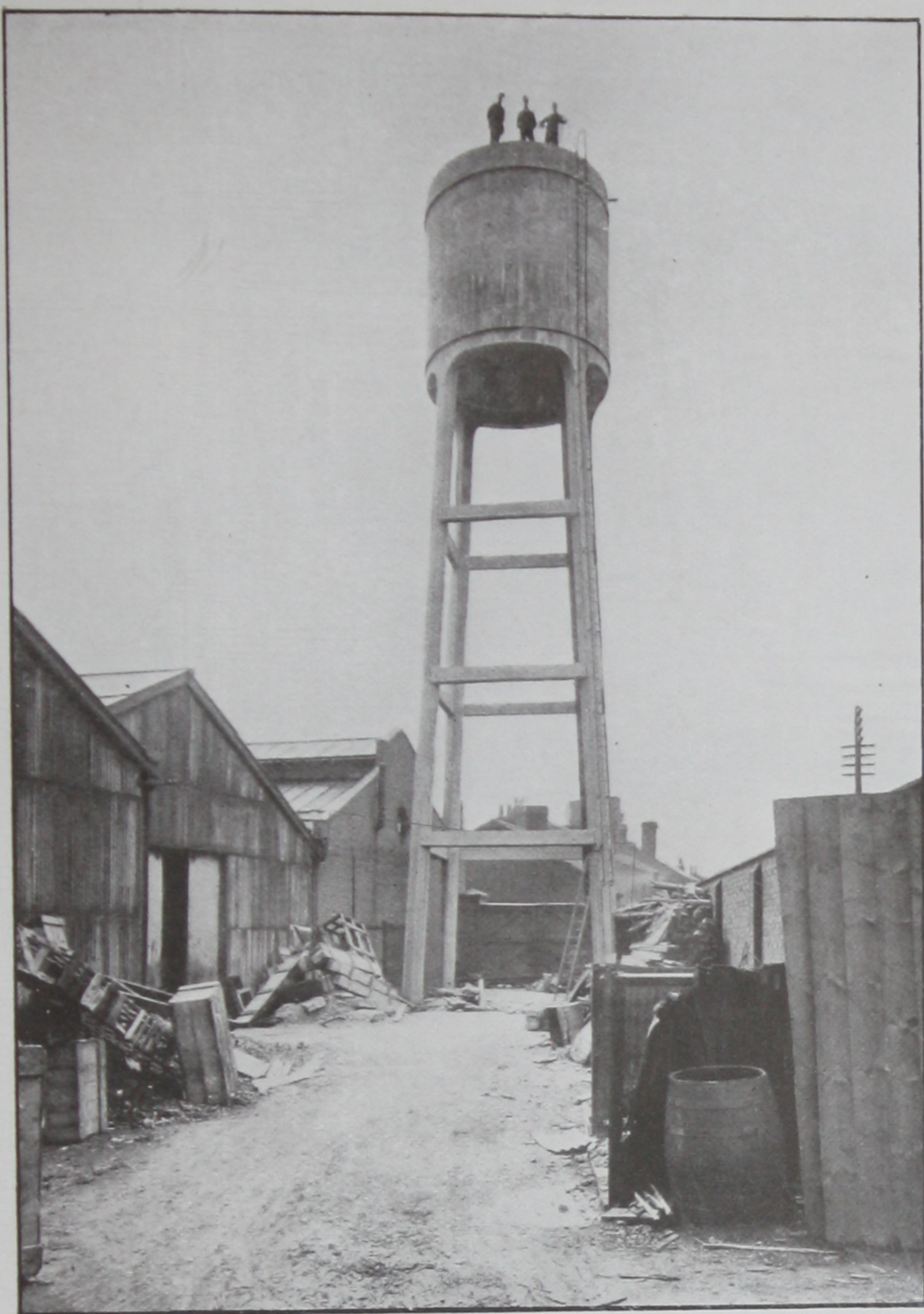
Burnham-on-Crouch, Essex.

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VICTORIA STREET, LONDON. S.W.1









FERRO-CONCRETE WATER TOWER.

For Messrs. Henry Hope & Sons, Ltd.

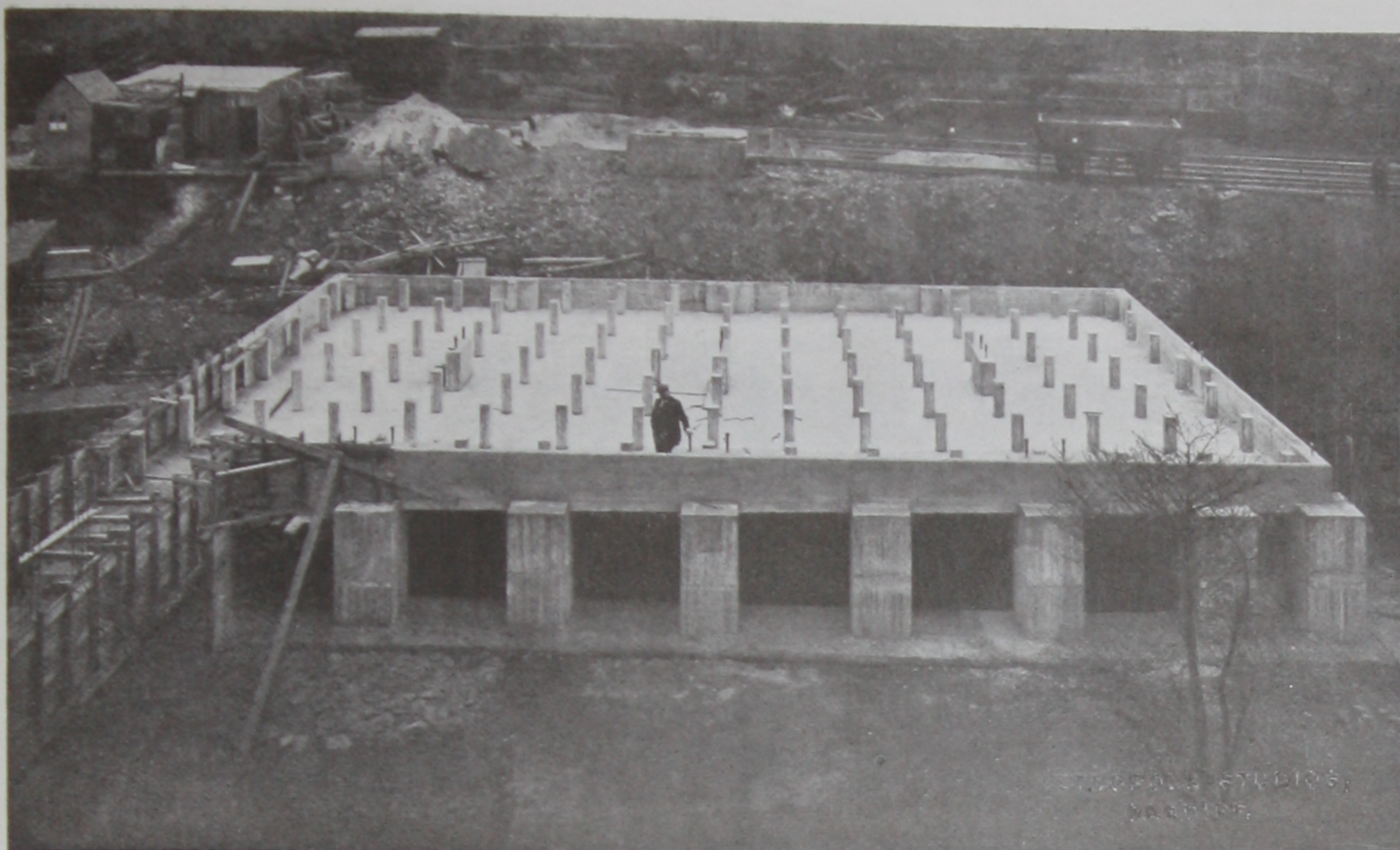
Smethwick, Birmingham.

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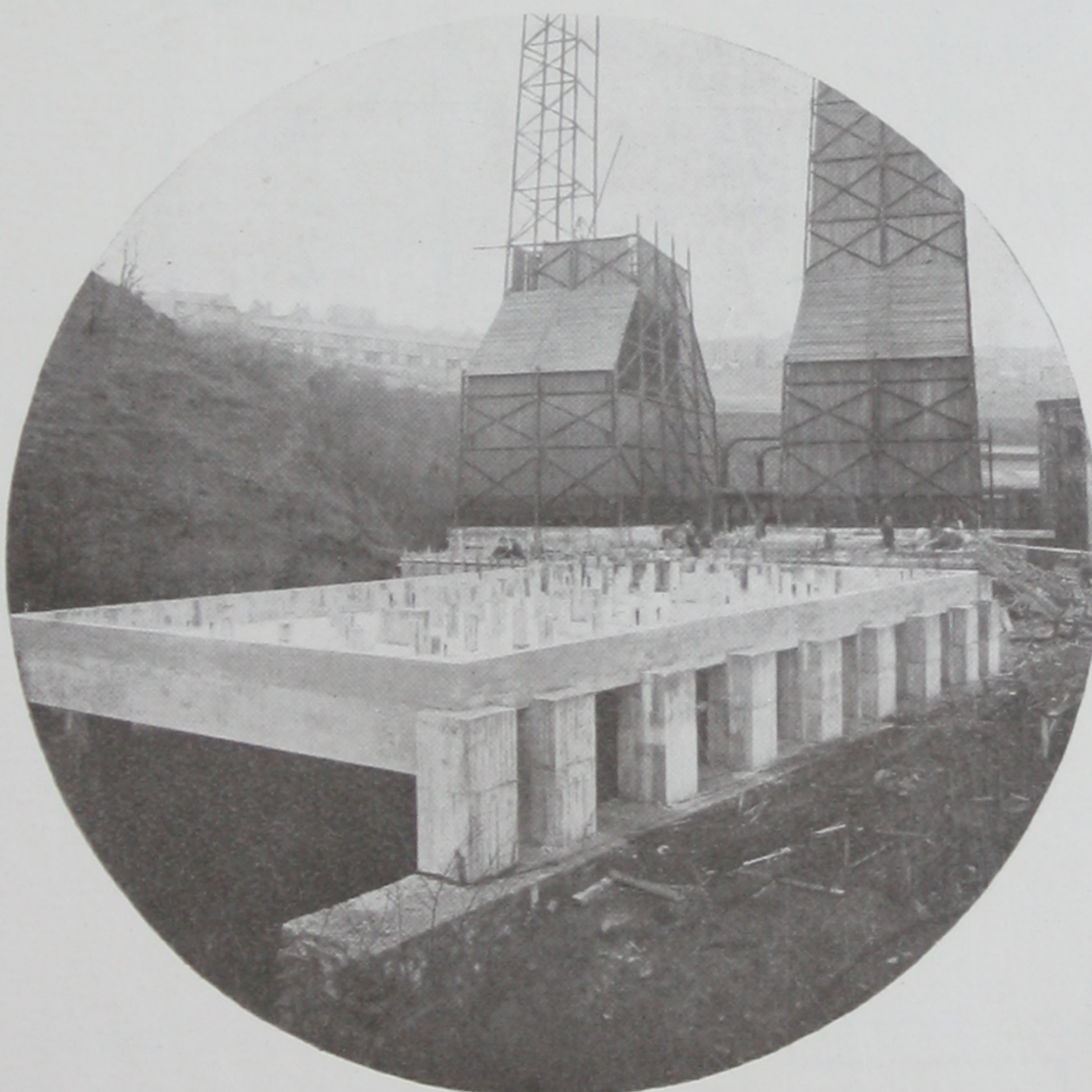


FERRO-CONCRETE  
COOLING TOWER  
TANK.

Spanning river 35' 0" wide.

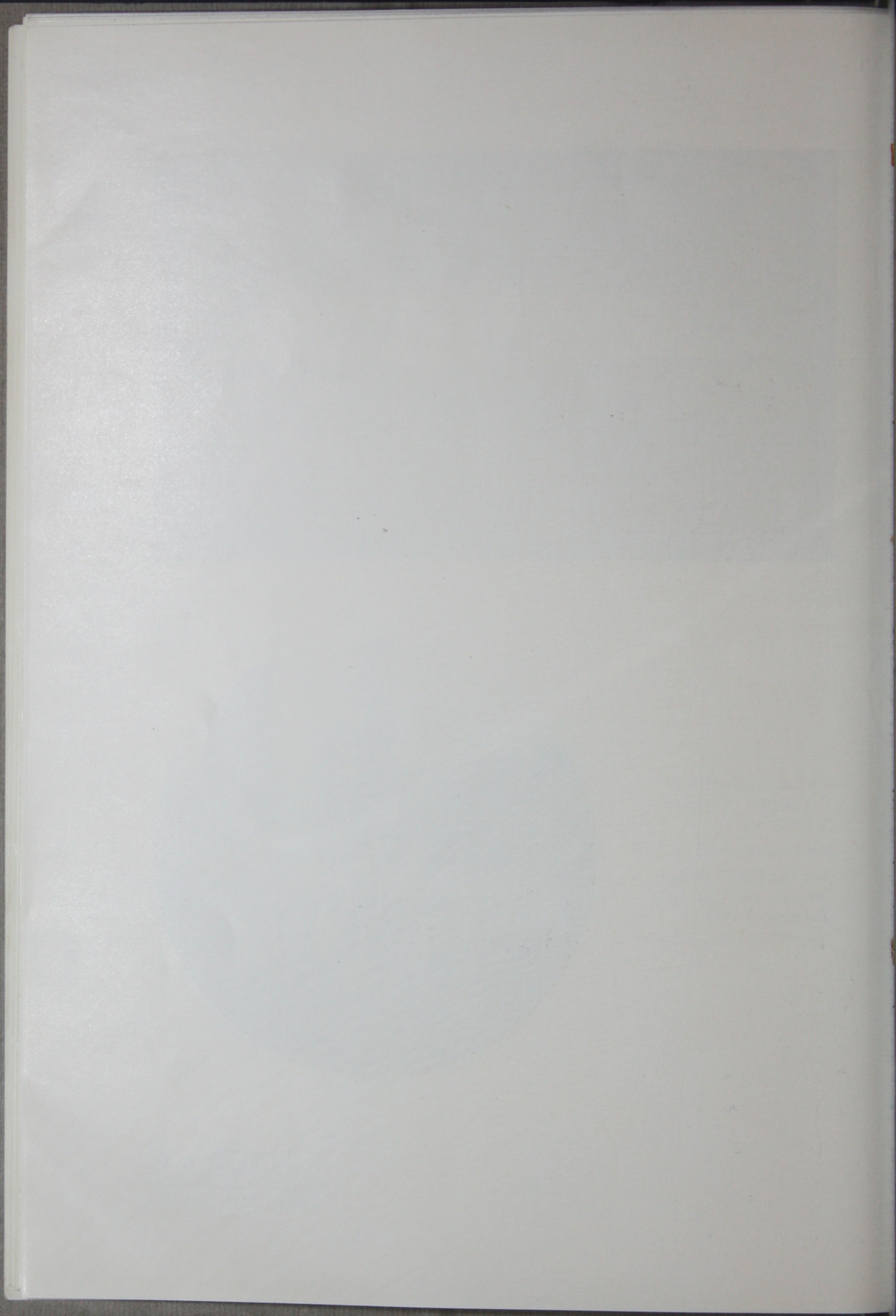
For The Powell Duffryn  
Steam Coal Co., Ltd.  
Bargoed, S. Wales.

(Ivor Williams, Esq., Engineer).

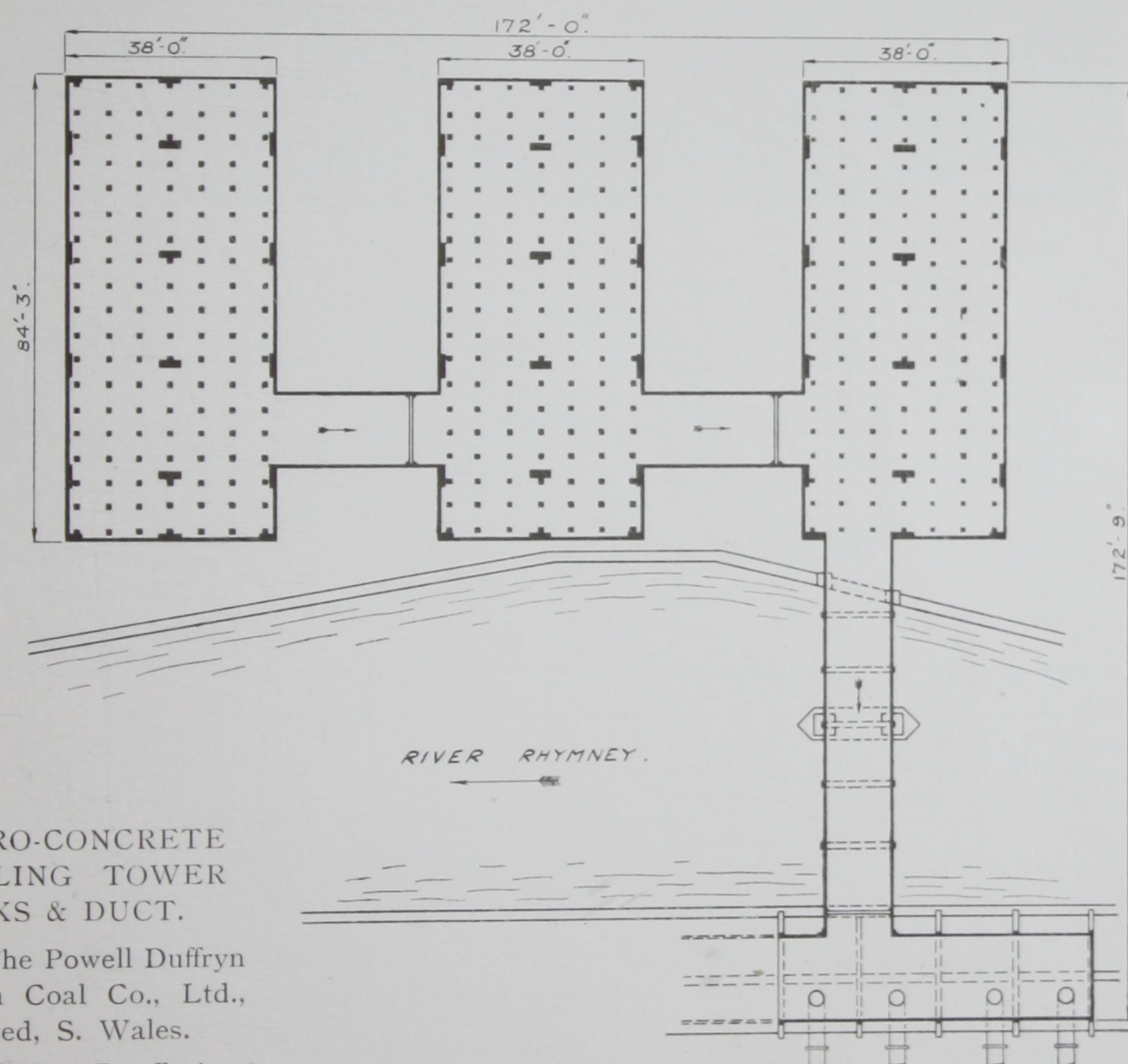
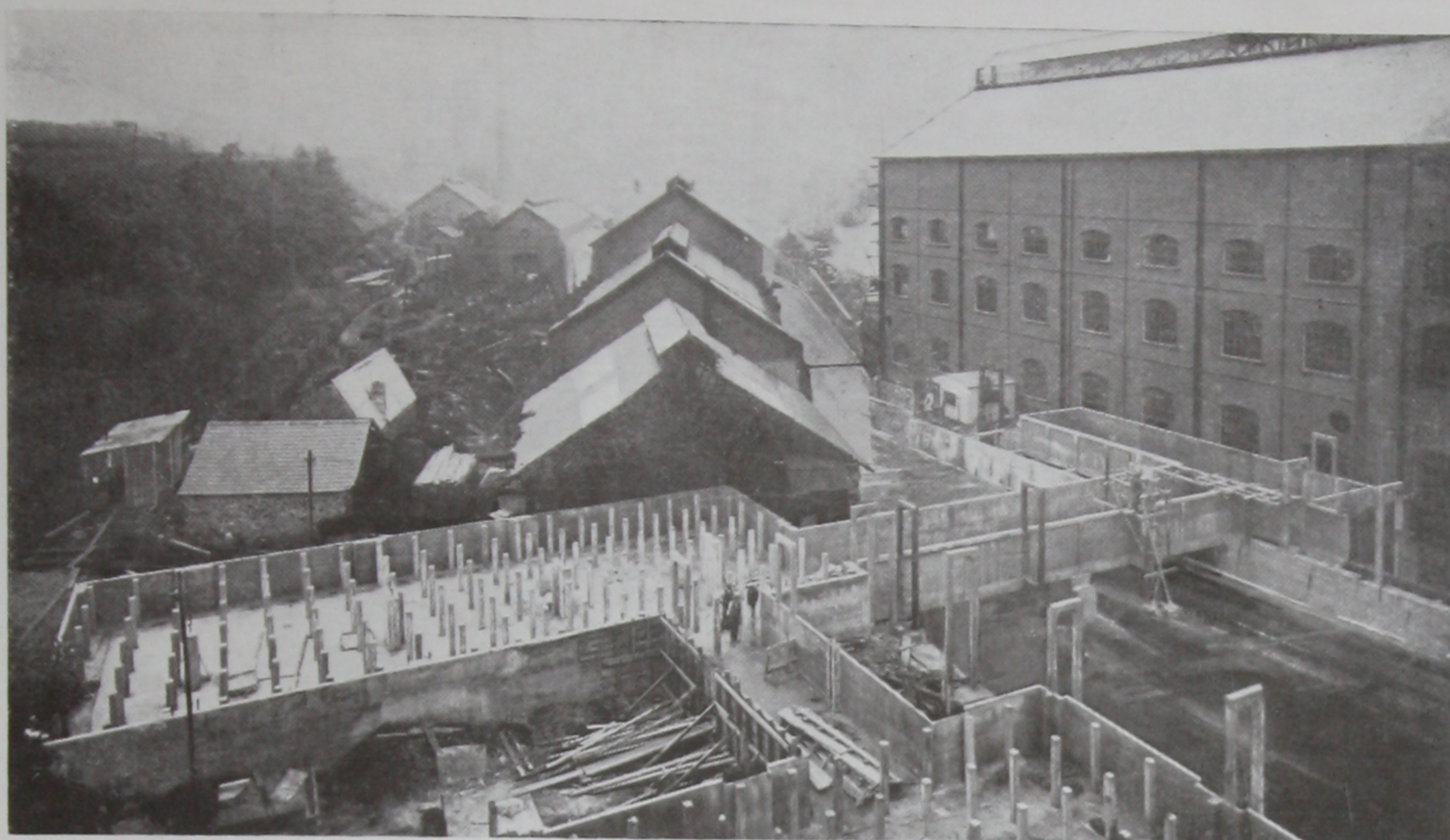


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FERRO-CONCRETE  
COOLING TOWER  
TANKS & DUCT.

For The Powell Duffryn  
Steam Coal Co., Ltd.,  
Bargoed, S. Wales.

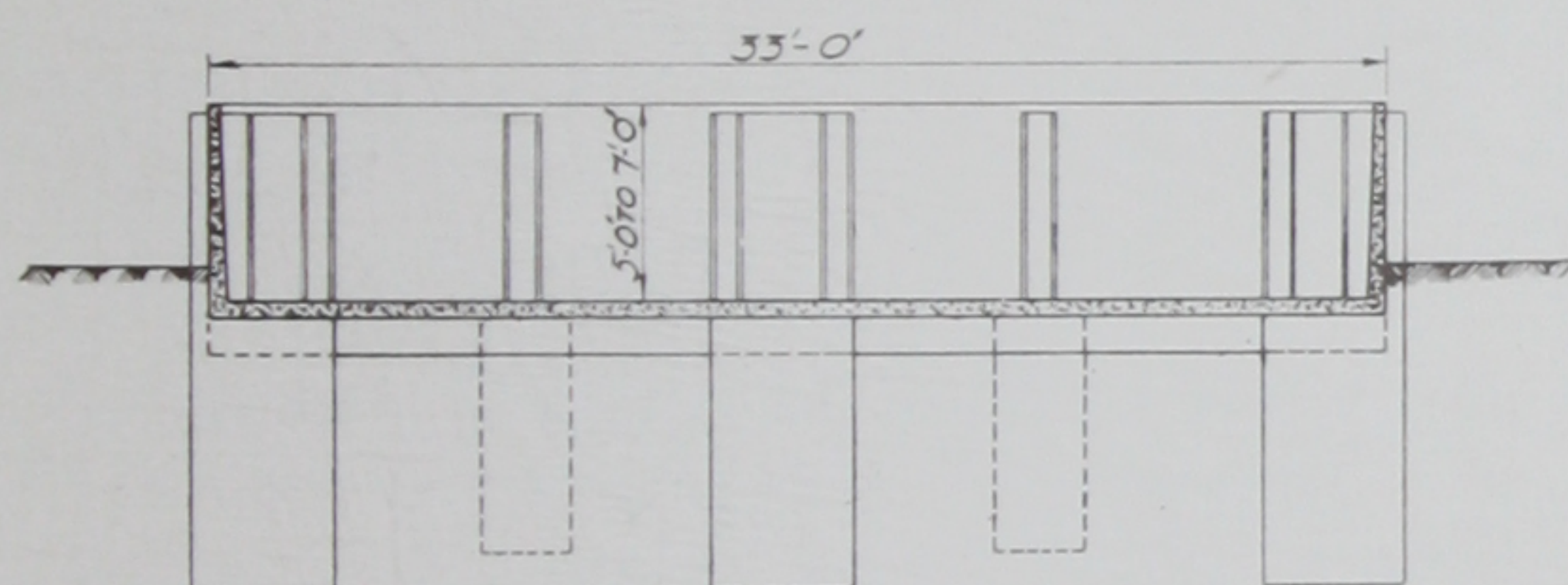
(Ivor Williams, Esq., Engineer).

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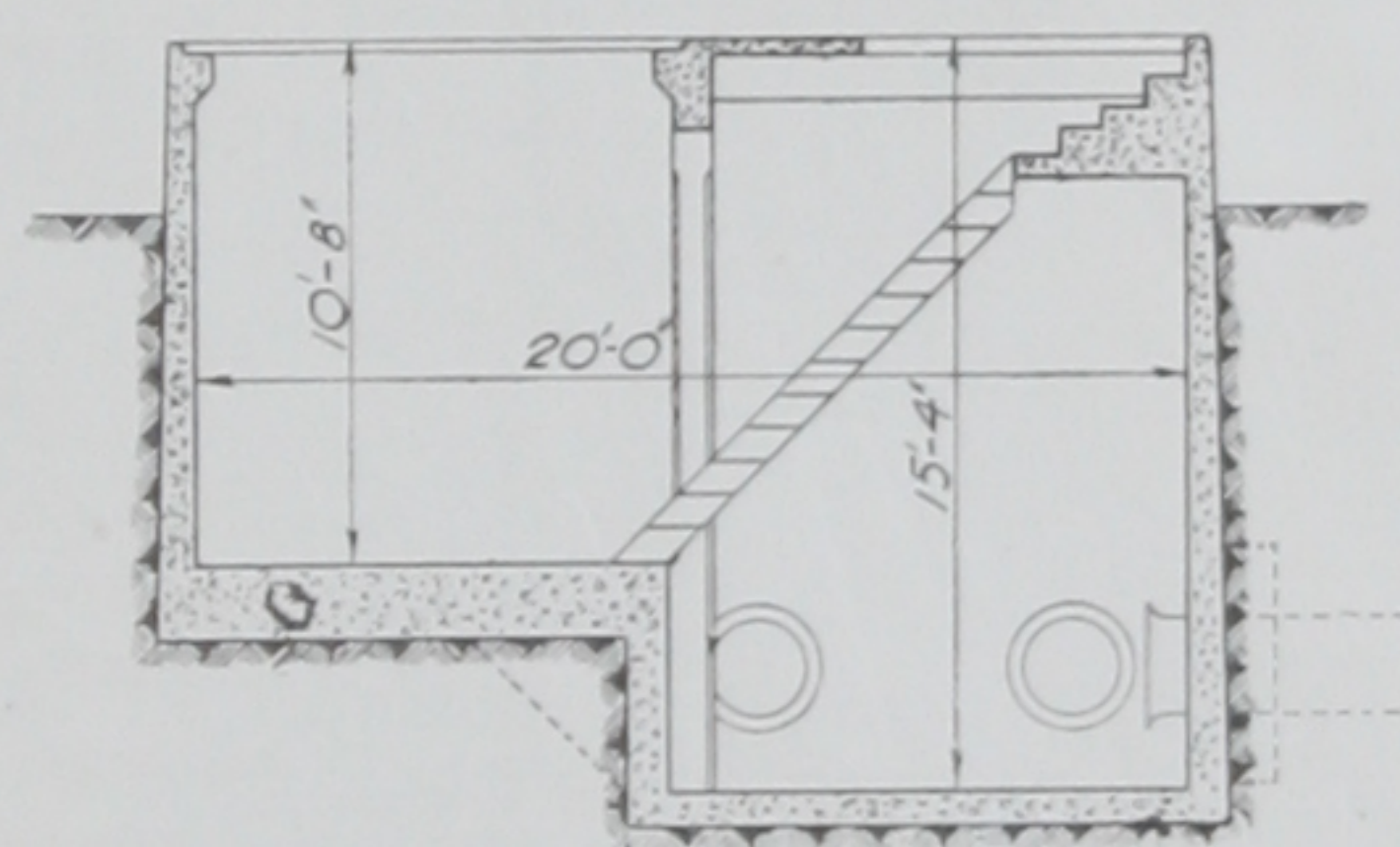








Cross Section of Tank.



Cross Section of Pump Chamber.

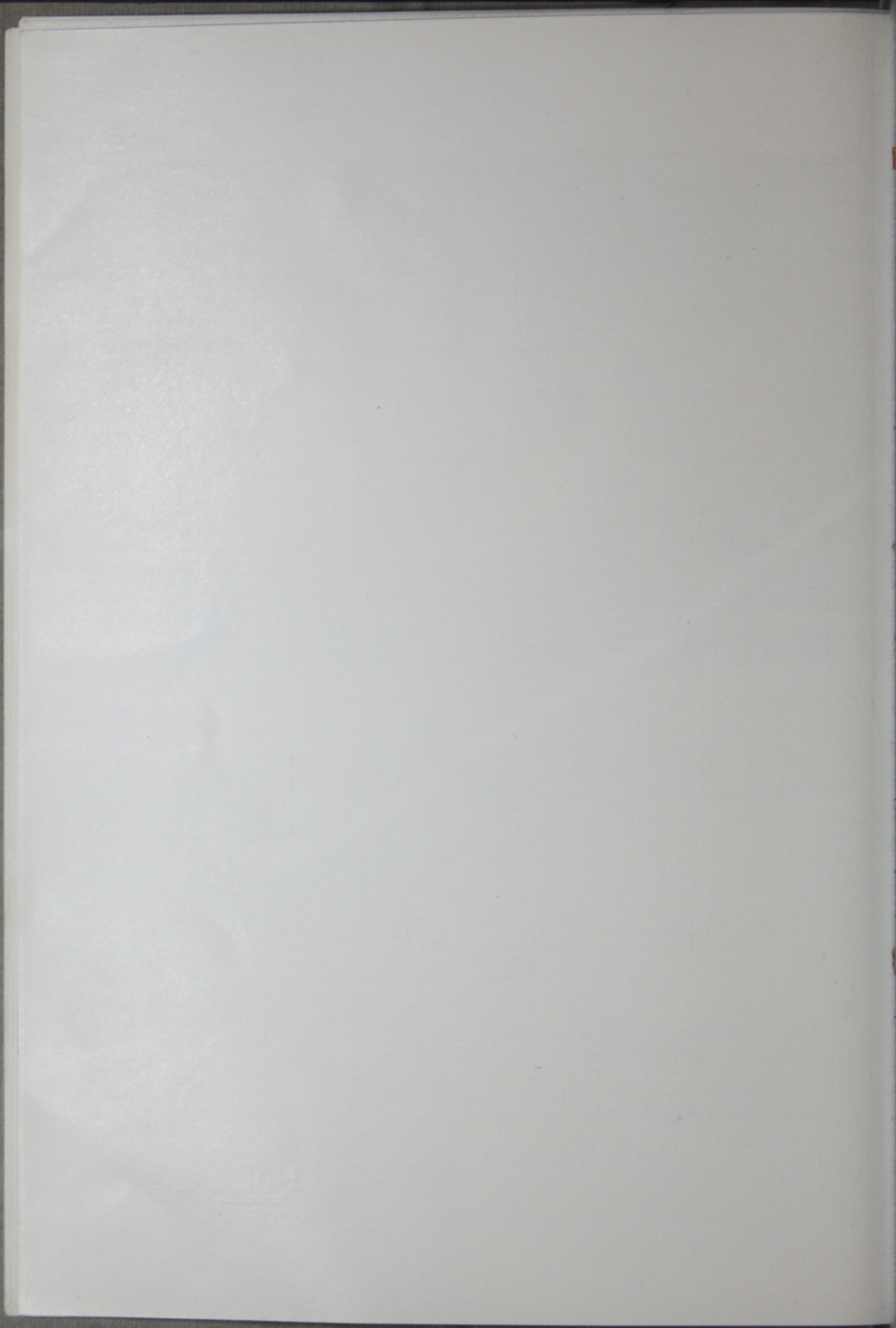
# FERRO-CONCRETE PUMP CHAMBER & COOLING TOWER TANK.

For the Walthamstow U.D.C. Electricity Dept.

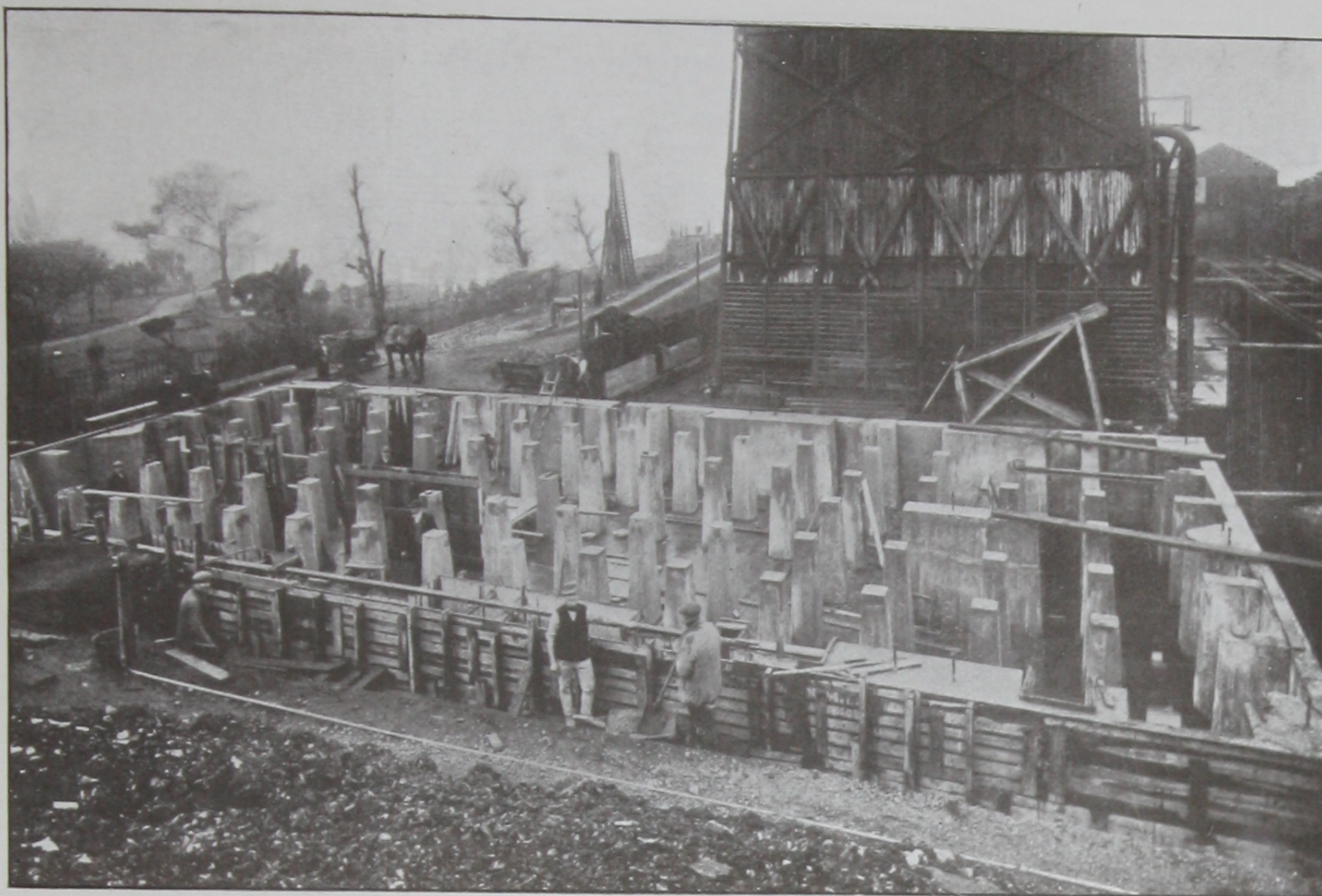
(G. R. Spurr, Esq., A.M.I.M.E., A.M.I.E.E., Electrical Engineer).

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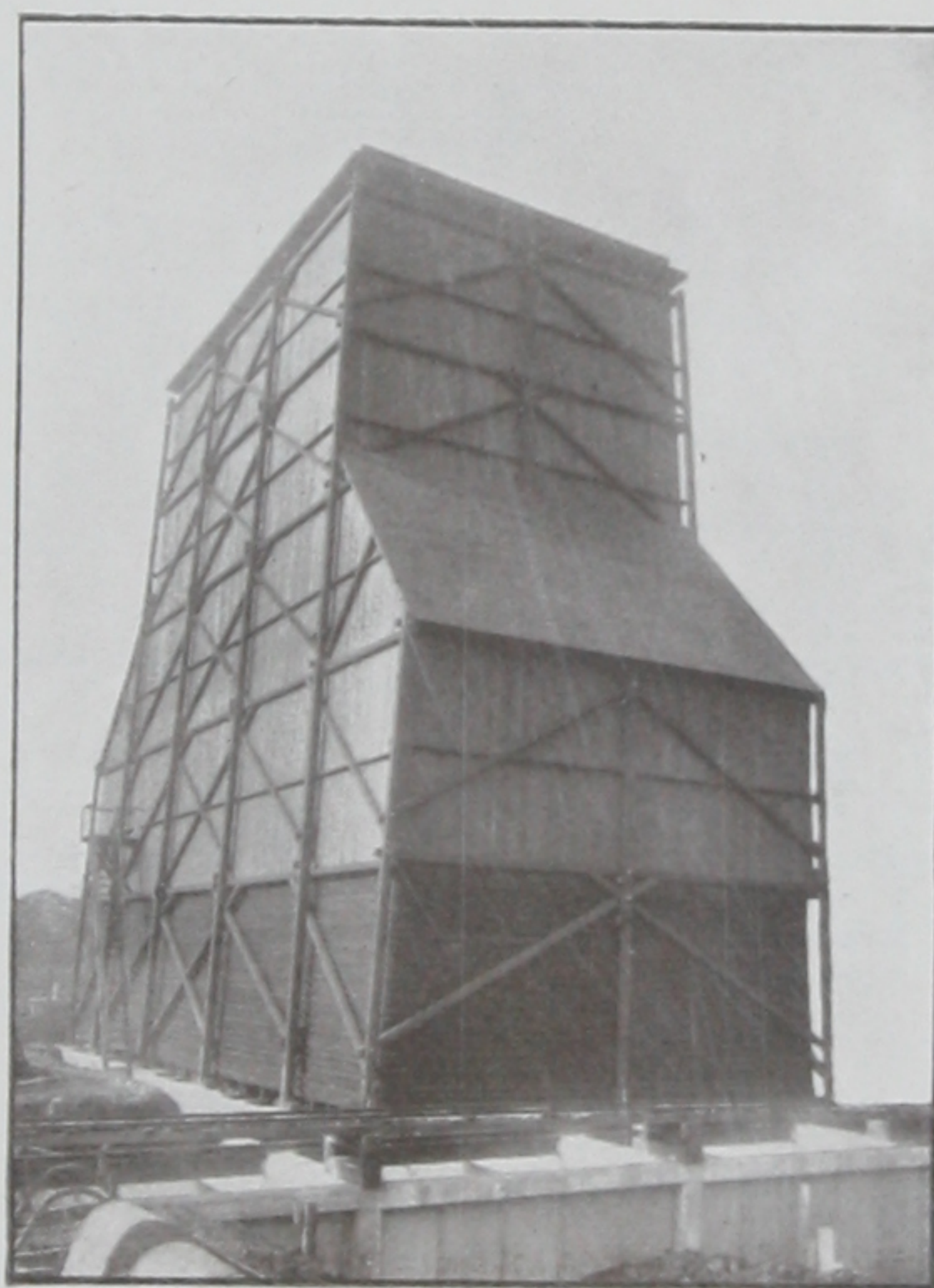






# COOLING TOWER TANK.

For Grimsby Corporation Electricity Dept.  
*(Lt.-Col. W. A. Vignoles, D.S.O., M.I.E.E., Engineer.)*

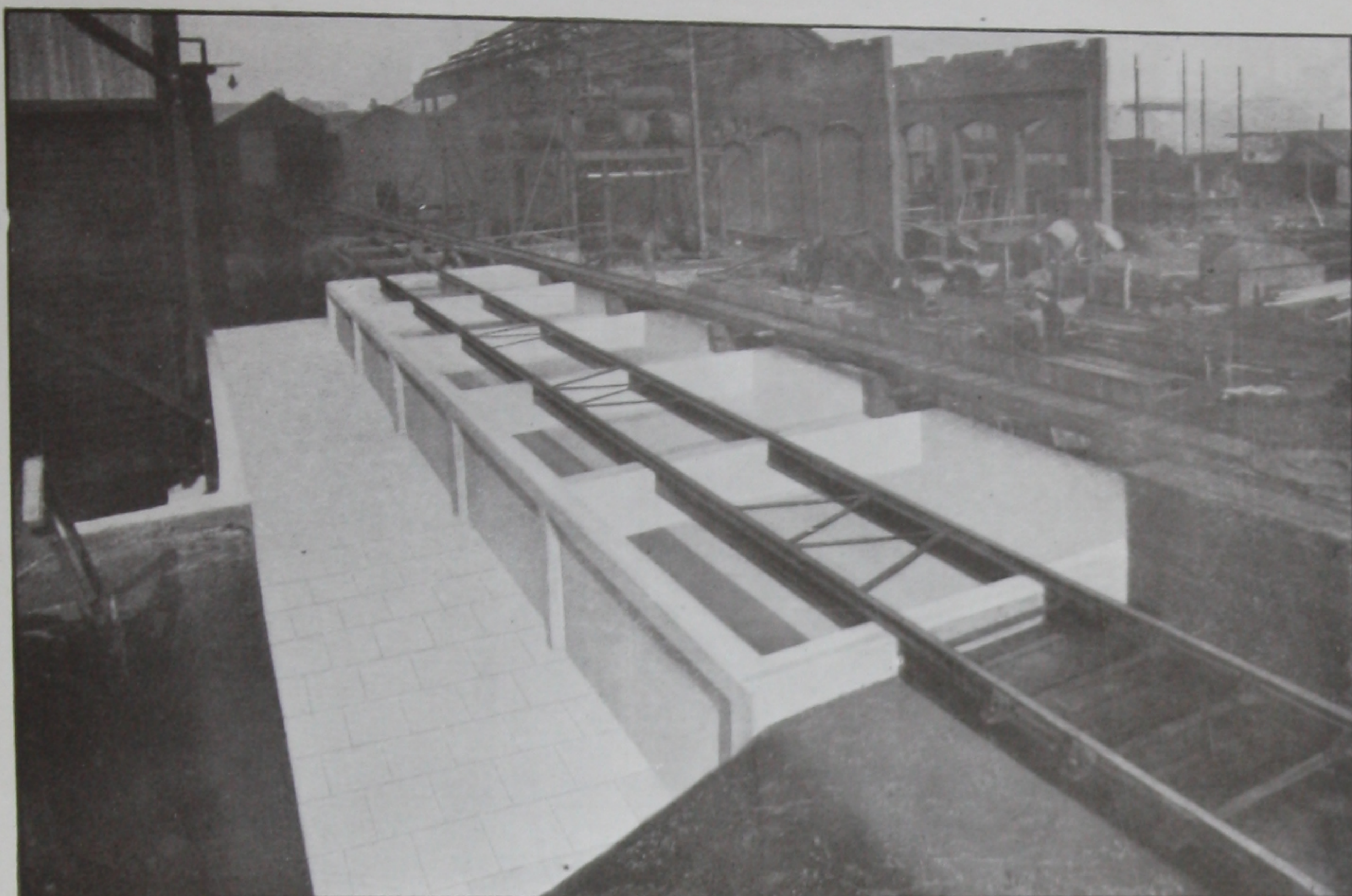


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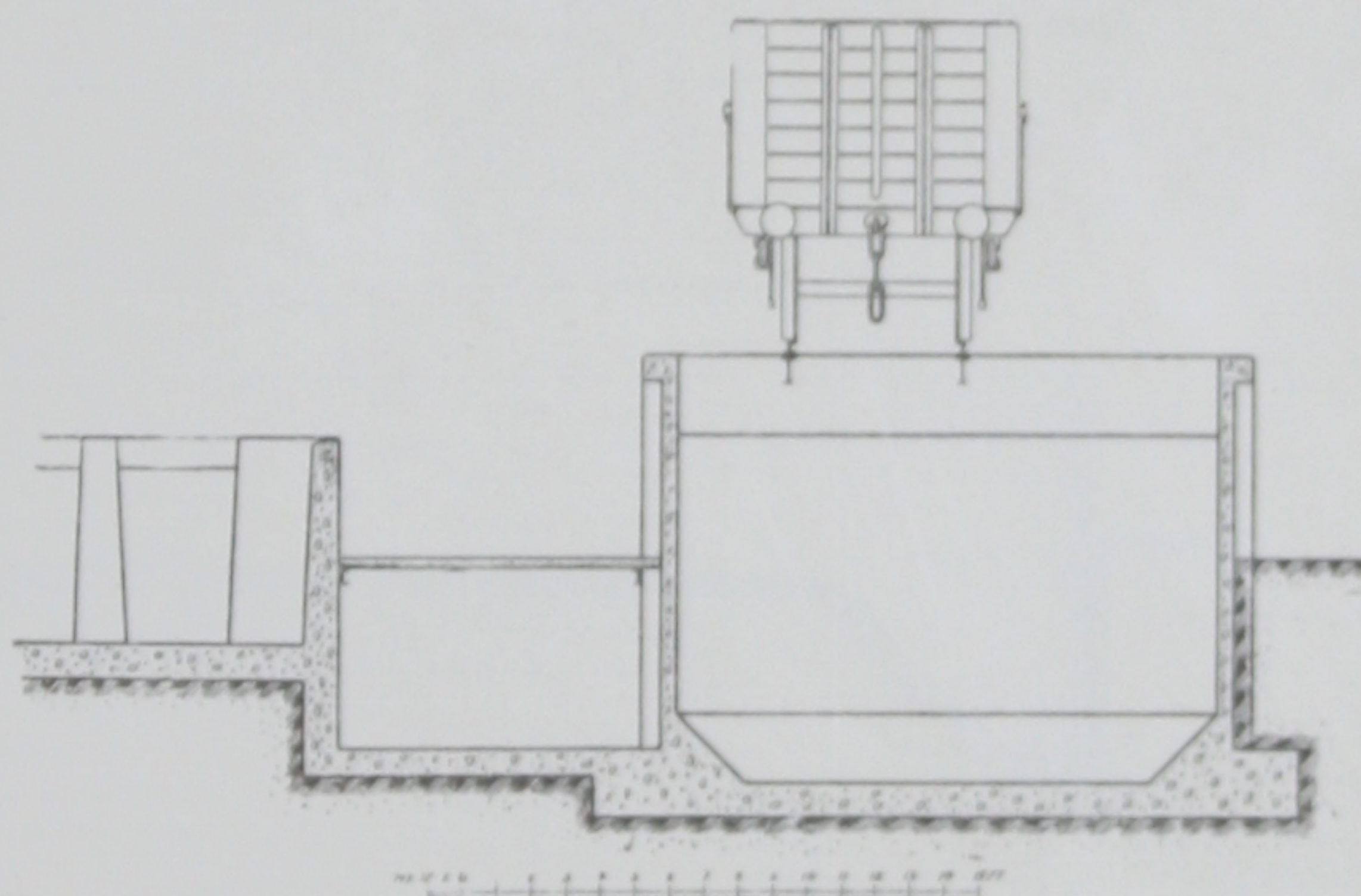






FERRO-CONCRETE  
COAL BUNKER.

For Grimsby Corporation  
Electricity Dept.  
(*Lt.-Col. W. A. Vignoles, D.S.O., M.I.E.E.,  
Engineer.*)

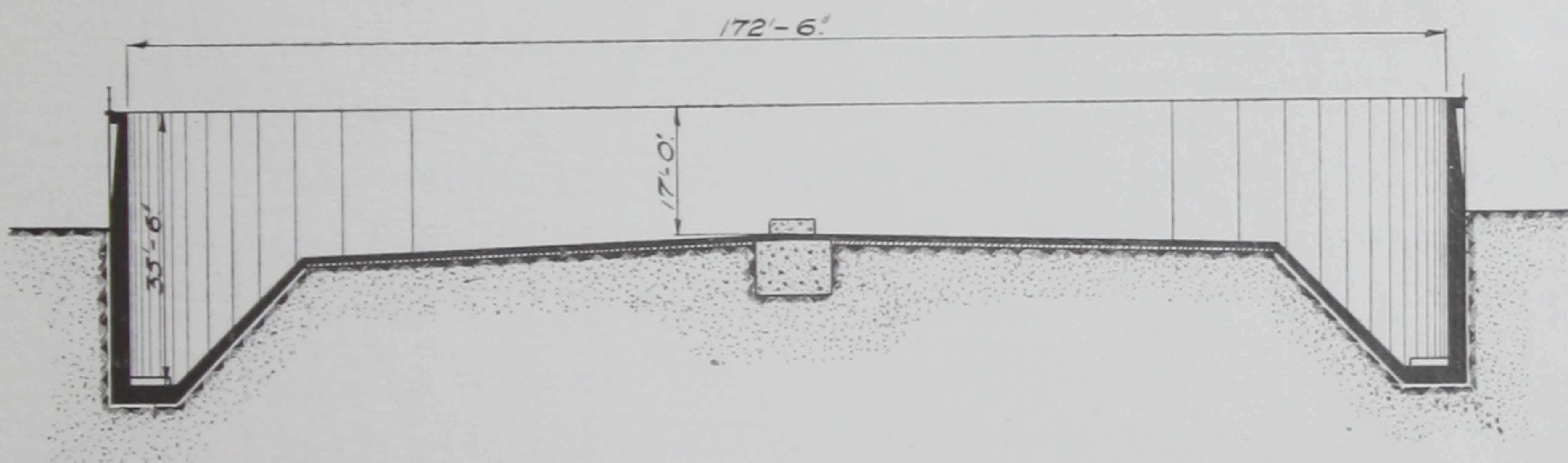
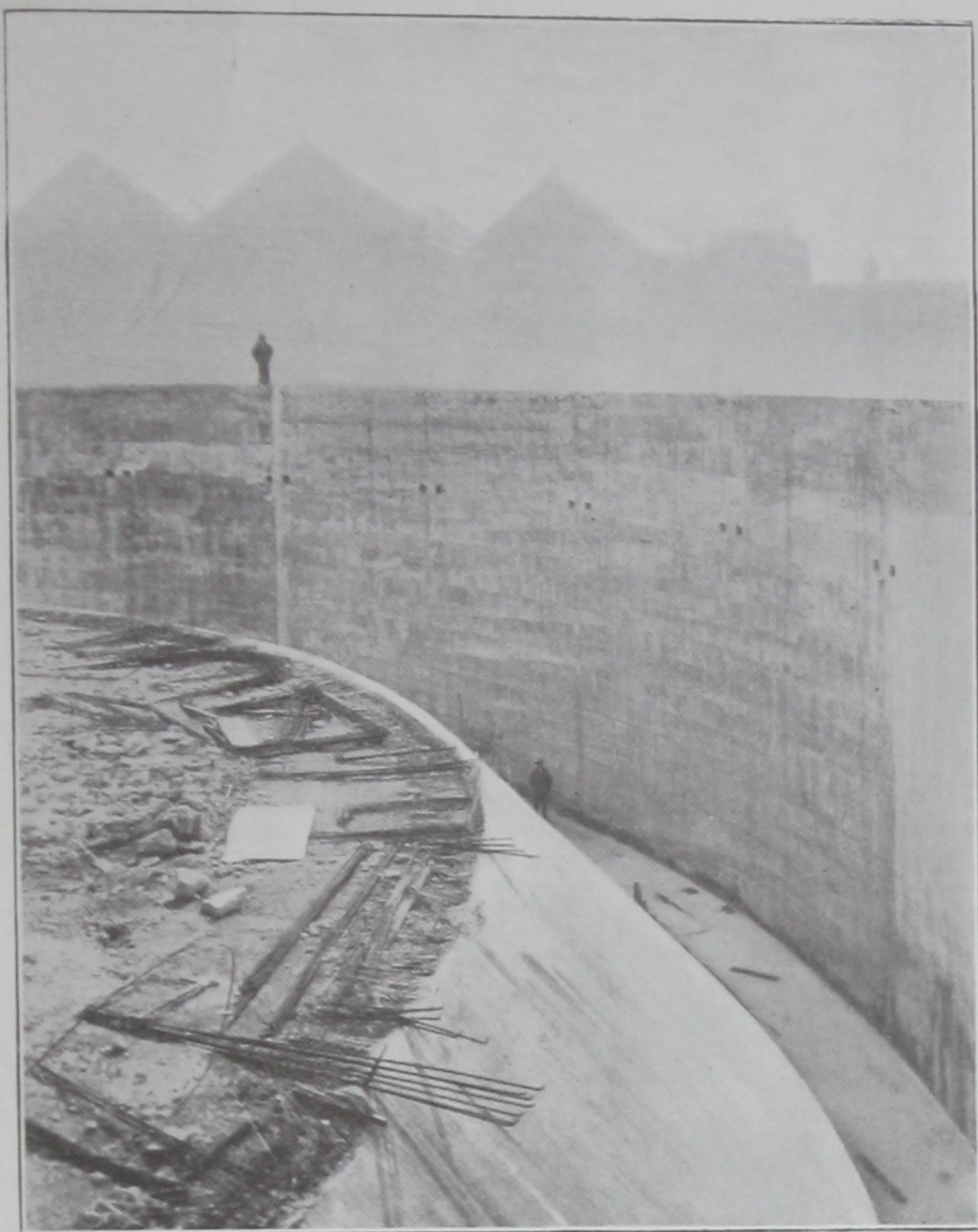


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Engineers & Contractors  
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VICTORIA STREET, LONDON, S.W.1









FERRO-CONCRETE GAS-HOLDER TANK.  
For the Dundee Corporation Gas Commissioners.  
(*Alex. Yuill, Esq., Engineer*).

**K. HOLST & Co.**  
Engineers & Contractors  
WESTMINSTER CHAMBERS,  
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## WHARVES & JETTIES

The remarks on the durability of ferro-concrete which we have made in connection with other types of structures apply with especial force to Marine Works. Unlike timber and steel, it is immune from decay and from the activities of the "teredo navalis" and age merely increases its strength and durability. Good concrete, properly placed, affords ample protection to the steel and no danger from the action of sea water need be anticipated if the work is carefully designed and carried out.

The fire-resisting qualities also are especially important in docks, where the risk of fire is always very great, and has by no means been diminished by the increased use of oil fuel.

## RETAINING WALLS, QUAY WALLS, &c.

The Retaining Wall is perhaps one of the most economical uses to which ferro-concrete can be put. The stability of a masonry or mass-concrete wall depends entirely upon its own weight, but when the wall is constructed in ferro-concrete the retained material itself rests upon a horizontal slab or base, and acting as a balancing weight, resists the overturning of the wall. The thickness of the wall itself may therefore be greatly reduced and the saving in the amount of concrete much more than counter-balances the cost of the steel required.

## MISCELLANEOUS STRUCTURES

Among the other numerous uses to which ferro-concrete may be put with advantage, may be mentioned :—

- (a) Pit head structures for collieries.
- (b) Tall Chimneys.
- (c) Telpher Supports.
- (d) Signal Posts and Telegraph Poles.



Information desired for the purpose of preparing Estimates

FOR WHARVES AND JETTIES

(See also page 6, and note regarding "Foundations" on page A2).

- (1) Give sketch plan showing loading dimensions of the proposed work, together with cross sections of the site, indicating the finished level of the deck.
- (2) State length and give cross sections of site, showing breadth, width and finished level of deck.
- (3) Specify loading to be provided for—
  - ? Railway track.
  - ? Crane track.

or (3a) Equivalent uniformly distributed load.

- (4) State :
  - (a) H.W.O.S.T.
  - (b) L.W.O.S.T.
  - (c) Velocity of current in river.
  - (d) Highest recorded flood level.

FOR RETAINING WALLS, QUAY WALLS, Etc.

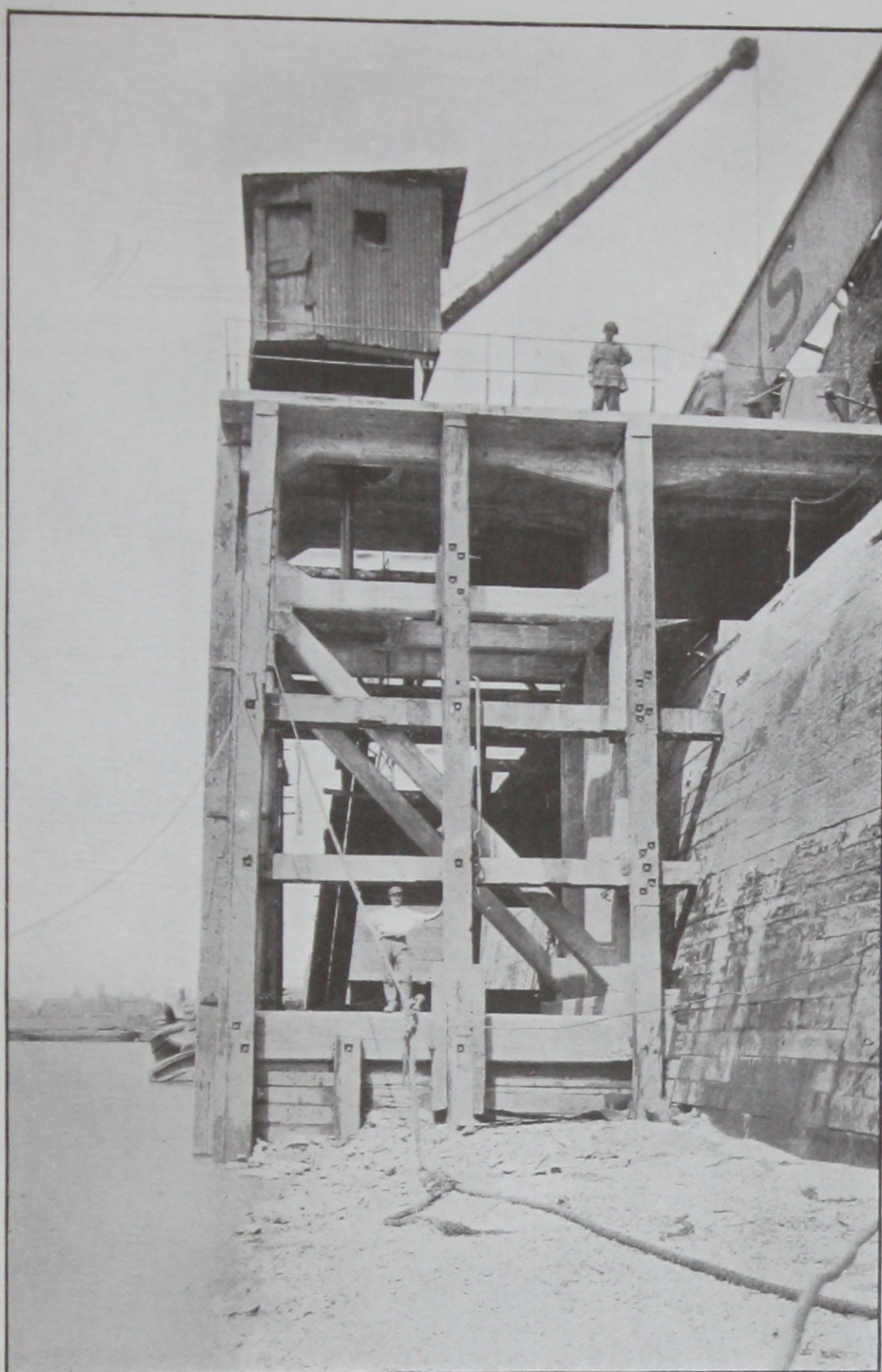
(See also page 6, and note regarding "Foundations" on page A2).

- (1) State length and give cross sections showing :—
  - (a) Its height above finished ground level at front of wall.
  - (b) Slope of ground above wall (*i.e.*, angle of surcharge) or other loading to be provided for.
- (2) Nature of retained material.
- (3) If a river wall, state the velocity of the current and indicate :—
  - (a) H.W.O.S.T.
  - (b) L.W.O.S.T.
  - (c) Highest recorded flood level.

FOR MISCELLANEOUS STRUCTURES

Full details of the requirements in each case should be given.





FERRO-CONCRETE CRANE JETTY.

For Messrs. Odams' Nitro-Phosphate & Chemical Co., Ltd.  
Victoria Dock, London, E.

**K. HOLST & Co.**  
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